THE DECAPODA BRACHYURA OF THE SIBOGA EXPEDITION

II

GONEPLACIDAE AND PINNOTHERIDAE

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THE DECAPODA BRACHYURA OF THE SIBOGA EXPEDITION

BY

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LEIDEN

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GONEPLACIDAE AND PINNOTHERIDAE

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INTRODUCTION.

In the present paper two families, Goneplacidae and Pinnotheridae, are dealt with, so that now the whole group of the Catometopous Crabs has been worked out.

The members of these families are for the most part little known, partly because of their usually small size and partly on account of the fact, that a great many species have a commensalistic mode of life, with Lamellibranchs in the majority of cases, but also in Holothurians, Echinoids, Ascidians, and in tubes of Annelids. They may be very scantily represented or even entirely absent in large collections, so the "Challenger" and the "Valdivia" obtained each only 11 species, the "Sealark" expedition in the Indian Ocean (1905) a single species.

The materials of the "Siboga" expedition proved to be very rich in this respect, and may easily stand a comparison with the large collection, made by MORTENSEN in the Gulf of Siam and examined by Miss RATHBUN (1910). The two families taken together yielded 50 species, 15 of which turned out to be new, and 3 of these represent as many new genera.

In a rapid glance over the results obtained we first take the Goneplacidae.

These are represented in the collection by 37 species, 12 of which are new to science, while 2 new genera are established. The genus *Litocheira* Kinahan yielded six species, three of which are new. The subfamily *Goneplacinae*, besides by two already known species of *Goneplax*, is represented by a new form of the remarkable New Zealandian genus *Ommatocarcinus* White. Of the subfamily *Prionoplacinae*, which is nearly exclusively American, the little known *Homoioplax haswelli* (Miers) Rathbun was found back; the genus *Speocarcinus* Stimpson, which was known only from the Atlantic and Pacific coasts of America, is represented by a new species; and finally a genus (*Lophoplax*) has been established on a new species. Of the subfamily *Rhizopinae* a whole series of new or little known species were obtained, numbering 18 in all; of these 5 new species (*Typhlocarcinops* Rathbun 2, *Xenophthalmodes* Richters 1, *Typhlocarcinodes* Alcock 1, *Hephthopelta* Alcock 1) belong to already known genera, a 6th species represents a new genus, *Paraselwynia*.

Of the Pinnotheridae (13 species) the rich genus *Pinnotheres* is of course abundantly represented; of the 8 species obtained I am satisfied to refer 6 to already known species, while 2 others are apparently new; the discrimination of the various species is often most troublesome. In the subfamily *Asthenognathinae* a genus, *Aphanodactylus*, is proposed to receive a

new species. Besides I have taken this opportunity to redescribe an old species, "*Malacosoma*" *reticulatum* de Man, which has never been figured, and of which I could examine the only known specimen.

In the following table the results arrived at are arranged.

Family Goneplacidae.

	Species	New
Subfam. *Pseudorhombilinae*		
Pilumnoplax Stimpson . . .	1	—
Eucrate de Haan	1	—
Psopheticus Wood-Mason . .	1	—
Litocheira Kinahan	6	3
Catoptrus A. Milne-Edwards .	2	—
Subfam. *Goneplacinae*		
Goneplax Leach.	2	—
Ommatocarcinus White . . .	1	1
Subfam. *Prionoplacinae*		
Homoioplax Rathbun	1	—
Speocarcinus Stimpson . . .	1	1
Lophoplax n. g.	1	1
Subfam. *Rhizopinae*		
Ceratoplax Stimpson	2	—
Typhlocarcinus Stimpson. . .	2	—
Typhlocarcinops Rathbun . .	3	2
Xenophthalmodes Richters . .	1	1
Mertonia Laurie	1	—
Notonyx A. Milne-Edwards . .	2	—
Paraselwynia n. g.	1	1
Scalopidia Stimpson	1	—
Typhlocarcinodes Alcock . . .	3	1
Hephthopelta Alcock	1	1
Camatopsis Alcock	1	—
Subfam. *Hexapodinae*		
Hexapus de Haan	1	—
Hexaplax Doflein	1	—
Total	37	12

Family PINNOTHERIDAE.

	Species	New
Subfam. *Pinnotherinae*		
Pinnotheres Latreille	8	2
Ostracotheres H. Milne-Edwards	1	—
Subfam. *Pinnotherelinae*		
Tetrias Rathbun	1	—
Subfam. *Xenophthalminae*		
Xenophthalmus White. . . .	1	—
Subfam. *Asthenognathinae*		
Chasmocarcinops Alcock	1	—
Aphanodactylus n. g.	1	1
Total	13	3

Many of the forms already described are nevertheless little known and my endeavours to fill these gaps of our knowledge, as far as I could, have greatly enlarged the scope of the present work, not only because I tried to arrive at a survey, as complete as possible with the means at my disposal, of all the Indo-Pacific, and partly also of the Atlantic, species, but also because it proved necessary to figure, either for the first time or anew, a large part of the "known" forms.

Again it is a grateful task to me to thank Dr. J. G. DE MAN for some good advice and for the loan of rare papers, which otherwise would be inaccessible to me.

Leiden, March 7, 1918.

GONEPLACIDAE.

This family has until recent years been generally assigned to the Ocypodidae, to which view the elongate eye-stalks of *Goneplax* at first sight afford a great probability. H. MILNE-EDWARDS in 1852 already divided his "tribu principale" *Ocypodinae* into two "agèles": *Ocypodiaceae* and *Gonoplaceae*, the latter again was split up into "*Gonoplacés vigils*" (including mostly genera, that are now known to constitute the subfamily *Macrophthalminae*) and "*Gonoplacés cancéroides*", with the genera *Gonoplax*, *Ommatocarcinus* and *Prionoplax*. Besides, two genera, *Pseudorhombila* and *Carcinoplax* are, under the name *Carcinoplacinae*, designated as "tribu satellite des *Ocypodinae*" [1]).

This classification, with slight alterations, has a long time been maintained and the group was, shortly after the publication of MILNE-EDWARDS' paper, greatly increased by STIMPSON [2]), who, besides adding some new genera to the Carcinoplacidae, established a new family, Rhizopidae, for the reception of several genera, and included both families in his "Ocypodoidea".

MIERS [3]) in 1886 divided the Ocypodidae into two subfamilies: *Carcinoplacinae* and *Ocypodinae*, one of the subgroups of the latter being the *Gonoplacinae*. Both *Carcinoplacinae* and *Gonoplacinae* were raised to the rank of families by ORTMANN [4]) in 1894 and united in a group CARCINOPLACINI, that is definitely removed from the Ocypodidae, which are included in another subgroup: GRAPSINI. This view, however, is far from having been accepted by subsequent authors [5]) who kept to the older classification, though ALCOCK [6]) in 1900 definitely established ORTMANN's view, and, by adding to our family the *Hexapodinae*, still enlarged it. In this paper ALCOCK's classification is followed.

Already by their habits the present family differs widely from the Ocypodidae: none of the species frequents the beach and none is living in fresh or brackish water; on the contrary all the species are strictly marine, showing a preference to deeper layers and some genera inhabit exclusively the deep sea. A great many of the species is very small and among these

1) Ann. Sc. Nat. (3), t. 18, 1852, p. 140—164.

2) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 93—96.

3) Rep. "Challenger", Brachyura, 1886, p. 222, 236—237.

4) Zool. Jahrb., Syst., Bd 7, 1894, p. 683—685.

5) Even in 1906 Miss RATHBUN (Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 834—835) persists in classing some genera of the present family with the Ocypodidae.

6) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 286—287.

a commensalistic mode of living with Lamellibranchs, in worm-tubes, corals etc. is either proved or rendered most likely.

The monographer's task is greatly impaired by a large number of species, and even of not a few genera, being very incompletely known and especially by the scarcity of good figures. ALCOCK indeed has given a most useful synopsis of British Indian species; he distinguishes the following subfamilies: *Pseudorhombilinae*, *Goneplacinae*, *Prionoplacinae*, *Rhizopinae* and *Hexapodinae*. Miss RATHBUN [1]) has afterwards proposed a new subfamily, *Typhlocarcinopsinae*, which for reasons explained further on I have not maintained.

The discrimination of the subfamilies has been given by ALCOCK.

Subfam. PSEUDORHOMBILINAE.

1852. *Carcinoplacinae* H. Milne-Edwards. Ann. Sc. Nat. (3), t. 18, p. 164.
1886. *Carcinoplacinae* Miers. Rep. "Challenger", Brachyura, p. 223.
1900. *Pseudorhombilinae* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 286, 292.

ALCOCK enumerates, though sometimes with a query, fifteen genera of the subfamily, removing at the same time *Geryon* Kröyer and *Camptoplax* Miers, that are referred to the Xanthidae. Of these fifteen genera *Brachygrapsus* Kingsley is almost certainly identical with *Litocheira* Kinahan, *Camptandrium* Stimpson has now turned out to be one of the Ocypodidae (see p. 68 of the first part of the present paper), *Cryptocoeloma* Miers is very little known and has been doubtfully referred by MIERS himself to the *Rhizopinae*, *Heteroplax* Stimpson is most likely synonymous with *Eucrate* de Haan, and *Platypilumnus* Wood-Mason seems to belong to the Xanthidae.

So there remain ten genera, of which two, viz. *Frevillea* A. Milne-Edwards [2]) (not *Freyvillea* as ALCOCK spells it) with three species, and *Bathyplax* A. Milne-Edwards [3]) with a single one [4]), are Atlantic and live on the western side of this ocean. Miss RATHBUN afterwards added two new genera, *Tetraplax* [5]), with one species, from the West Indies, and *Trizocarcinus* [6]), likewise with one species, from the Gulf of California. All these American genera, except perhaps the last, are most incompletely known and, except for *Bathyplax* and *Trizocarcinus*, have never been figured.

This subfamily, like the *Prionoplacinae*, has the utmost affinity with such Xanthoid forms like *Eucratodes* A. Milne-Edwards and indeed it is nearly impossible to trace a distinct boundary; on the other hand the genus *Catoptrus* A. Milne-Edwards is perhaps better to be referred to the Portunidae.

I have here, following ALCOCK, retained the name of the subfamily, but the genus

1) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 345.
2) Bull. Mus. comp. Zool. Harvard Coll., v. 8, 1880, p. 15.
3) L. c., p. 16.
4) MIERS (Rep. "Challenger", Brachyura, 1886, p. 230, pl. 20, f. 3) describes a subspecies.
5) Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 9. The type is *Frevillea quadridentata* Rathbun; Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 287, p. 8, f. 1.
6) Proc. U. S. Nat. Mus., v. 47, 1914, p. 117, textfig. 1, pl. 1. The type is *Carcinoplax dentata* Rathbun, Proc. U. S. Nat. Mus., v. 16, 1893, p. 243.

Pseudorhombila H. Milne-Edwards is very obscurely known. A long time it contained only a single species, *Ps. quadridentata* [1]), known only by a most incomplete description and never figured, and the habitat of which is unknown. In recent years Miss RATHBUN [2]) described a new West Indian species, *Ps. octodentata*, but again without any figure.

To ALCOCK's useful memoir it may be again allowed to refer for the discrimination of the genera (p. 297—298).

Carcinoplax H. Milne-Edwards.

1833. *Curtonotus* (part.) de Haan. Faun. Japon., Crust., p. 21 (praeocc.).
1852. *Carcinoplax* H. Milne-Edwards. Ann. Sc. Nat. (3), t. 18, p. 164.

The "Siboga" did not secure any representative of this genus, which is the more astonishing, as no less than seven new species have been recently collected by the "Albatross" in Philippine waters and described by Miss RATHBUN. I must restrict myself to the mere enumeration of the species in chronological order.

1835. *C. longimana* (de Haan). Literature: ALCOCK, l. c., p. 303. A new subspecies (*indica*) has been described by DOFLEIN (Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 114, pl. 35, f. 1—2). The Indian specimens appear all to be referable to this subspecies; the typical species inhabits Japanese waters.

1858. *C. eburnea* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94. Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 94. Hab. Bonin Islands, in shallow waters.

1891. *C. longipes* (Wood-Mason). Literature: ALCOCK, l. c., p. 303. DOFLEIN, l. c., p. 117. Hab. Travancore coast, Andamans, Nicobars, in depths of 400—785 metres.

1914. *C. bispinosa* Rathbun. Proc. U. S. Nat. Mus., v. 48, 1914, p. 137. Hab. Philippine waters, in 90 fathoms.

1914. *C. spinossissima* Rathbun. Ibid. p. 139. Hab. like the preceding, in 165 fathoms.

1914. *C. confragosa* Rathbun. Ibid. p. 140. Hab. like the preceding, in 127 fathoms.

1914. *C. purpurea* Rathbun. Ibid. p. 140. Hab. like the preceding, in 90 fathoms.

1914. *C. angusta* Rathbun. Ibid. p. 142. Hab. like the preceding, in 90 fathoms.

1914. *C. verdensis* Rathbun. Ibid. p. 143. Hab. like the preceding, in 394 fathoms.

1914. *C. specularis* Rathbun. Ibid. p. 143. Hab. like the preceding, in 159 fathoms.

Pilumnoplax Miers.

1886. *Pilumnoplax* Miers. Rep. "Challenger", Brachyura, p. 225.
Nec *Pilumnoplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 93.

This genus was established in 1858 to receive four species: *sulcatifrons, longipes, sculpta*

1) Hist. Nat. Crust., t. 2, 1837, p. 59.

2) Proc. Biol. Soc. Washington, v. 19, 1906, p. 91. It is indeed disappointing to find, how this author at every time misses the opportunity of filling up the gaps and incompletenesses in carcinological literature and, I am sorry to say, frequently adds to the existing confusion. Obscure species, the systematic place of which is even often uncertain, are passed by with hardly any comment whatever; new species are rapidly glanced over, her descriptions take the form of short notes, hurriedly thrown down, and figures are either not at all given, or, if so, are often dispensed with by photographs, which, in many cases, leave one unsatisfied about essential features. Enormous productivity of work is by no means always associated with painstaking exactness.

and *ciliata*. The first species, however, certainly belongs to *Eucrate* de Haan; *longipes* is very obscurely known, but according to STIMPSON's posthumous treatise [1]) the front is "deflexed and emarginate at the middle" and with a supra-marginal line of long hairs, which suggests an affinity to *Litocheira* Kinahan; *sculpta* is according to STIMPSON's figure [2]) too much sculptured to belong to *Pilumnoplax* and the front is likewise deflexed [3]); finally *ciliata* is doubtless a species of *Litocheira*.

The name should, then, become a synonym, partly of *Eucrate*, partly of *Litocheira*, but MIERS afterwards included into *Pilumnoplax* two species, which certainly warrant the constituting of a new genus and, though strictly speaking the name given by STIMPSON is not admissible, I have retained it here. We must in this case adhere to ALCOCK's definition [4]) of the genus, and particularly exclude from it those species with the front turned strongly down and bilobed; in genuine *Pilumnoplax* the front is, on the contrary, feebly deflexed, in a line with the general longitudinal curve of the carapace, overhanging the antennulae, and with the anterior margin perfectly straight and usually entire; the carapace is flattened from side to side and hairless; the ambulatory legs are slender.

The species of the genus thus restricted are all inhabitants, as far as is known, of the deeper parts of the ocean bottom, save *P. vestita* (de Haan), which seems to live in shallow water. This species deviates also in its outer aspect from the other species, for the carapace, the legs and especially the chelae are very hairy, the front does not overhang the antennules, and the legs are stout and short; yet, following MIERS and ORTMANN, I have let it retain its place in the present genus. On the other hand I have serious doubts about the true systematic place of *P. acanthomerus* Rathbun [5]), found at only 30 fathoms near the Amirante Islands in the Western Indian Ocean. This species has the front nearly half as broad as the carapace, with the anterior edge sinuous, emarginated in the middle and near each lateral angle, the chelipeds and ambulatory legs are profusely spiny, stout and bulky.

I thus admit only the following species, one of which has been brought home by the "Siboga":

P. vestita (de Haan)
P. heterocheir (Studer)
P. abyssicola Miers
P. glaberrima Ortmann
P. americana Rathbun
P. cooki Rathbun.

Key to the species:

1. Carapace much hairy, with two widely separated, little prominent teeth behind each external orbital angle. Chelae with a long fur on proximal and upper part of outer surface. Ambulatory

1) Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 91.
2) Ibid., p. 91, pl. 11. f. 3.
3) I shall refer to this species later on, as the "Siboga" caught a species nearly related to it.
4) "Investigator" Deep Sea Brachyura, 1899, p. 74; Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 311.
5) Transact. Linn. Soc. London (2), v. 14, 1911, p. 237, pl. 18, f. 3.

	legs short and stout, heavily fringed, especially propodites of last pair of legs.	*P. vestita* (de Haan) [1]
	Carapace and legs naked	2
2.	Inner angle of wrist of cheliped with two spines	3
	Inner angle of wrist with only one spine	4
3.	Carapace granulate anteriorly, front notched in the middle, epigastric lobes distinct, gastric and anterior branchial regions with transverse ridges. Ambulatory legs about twice the length of carapace, mero-, carpo- and propodite roughly granulate at anterior margin	*P. heterocheir* (Studer) [2]
	Carapace smooth, finely frosted, front grooved, but not notched in the middle, no epigastric lobes. Ambulatory legs slender, penultimate pair about three times the length of carapace, not granulate at anterior margin	*P. americana* Rathbun [3]
4.	Both epibranchial teeth behind ext. orb. angle prominent, acute and of equal size	*P. abyssicola* Miers
	Anterior epibranchial tooth small and blunt, next one strong, spiniform	5
5.	Inner angle of wrist of cheliped prominent, acute, in the middle of inner surface of palm one obtuse tubercle. Propodite of last pair of ambulatory legs somewhat depressed and flattened. .	*P. glaberrima* Ortmann [4]
	Inner angle of wrist subrectangular. Ambulatory legs slender, second pair more than twice the length of carapace; propodites of last pair not flattened.	*P. cooki* Rathbun [5]

1. *Pilumnoplax abyssicola* Miers.

1886. *Pilumnoplax abyssicola* Miers. Rep. "Challenger", Brachyura, p. 228, pl. 19, f. 2.

Stat. 139. 0° 11′ S., 127° 25′ E. Between Kajoa Island and Batjan. Depth 397 m. 1 ♂.
Stat. 266. 5° 56′.5 S., 132° 47′.7 E. South-east of Kei Islands. Depth 595 m. 1 ♂ juv.
Stat. 267. 5° 54′ S., 132° 56′.7 E. South east of Kei Islands. Depth 984 m. 1 ♂.

This interesting species has been well described and figured by MIERS, so that a long description is useless. According to MIERS the carapace is closely granulate and pubescent near the margins, in the specimens at hand, however, the carapace is not granulate, but densely

1) *Cancer (Curtonotus) vestitus* de Haan, Faun. Japon., Crust., 1835, p. 51, pl. 5, f. 3; *Carcinoplax vestitus* H. Milne-Edwards, Ann. Sc. Nat. (3), t. 18, 1852, p. 164; *Pilumnoplax vestita* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 687; *Carcinoplax vestita* Rathbun, Proc. U. S. Nat. Mus., v. 26, 1903, p. 24. Hab. Japan.

2) Literature and description: MIERS, Rep. "Challenger", Brachyura, 1886, p. 227, pl. 19, f. 1; DOFLEIN, Wiss. Erg. "Valdivia", Bd 6, Brachyura, 1904, p. 119; STEBBING, Transact. Roy. Soc. Edinburgh, v. 50, prt 2, 1914, p. 265. Hab. Southern parts of Atlantic and Indian Ocean, in depths from 75 tot 375 fathoms.

3) Literature and description: DOFLEIN, l. c., p. 120, pl. 35, f. 3—4. Hab. Atlantic coast of North America, coast of Travancore (British India), west coast of Sumatra, in depths varying from 80 to 440 fathoms.

4) Zool. Jahrb., Syst., Bd 7, 1894, p. 687, pl. 23, f. 2. Hab. Japan, depth unknown.

5) Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 835, pl. 7, f. 3. Hab. Hawaiian Islands, in 256—330 fathoms.

punctate, when seen under the lens, and there is not a trace of pubescence. The dentation of the margins agrees quite well with MIERS' figure, specially with his figure 2*a*, which presents the anterior part of the cephalothorax in ventral view. The meropodite of the cheliped is armed with an obsolete tooth near the distal end of the superior margin, the inner angle of the wrist strongly prominent, the palm perfectly smooth, minutely punctate, at least in the adult (in the young ♂ the palms are closely studded with small, sharp granules); the chelae are unequal, the right being the larger; in the larger chela the palm is higher, the fingers are shorter and more strongly toothed than in the left; in both chelae the fingers are longitudinally grooved; the mobile finger of the right bears a strong, obtuse tooth, curved backward, near the base of the inner margin. In the adult ♂ of Stat. 139 the fingers retain still a light-brown colour, like that of the cornea, and the propodites of the ambulatory legs are clad with a short fur, wrapped all round, and extending on to the dactyli; in the second adult and in the young the fingers are nearly or wholly colourless, the two last joints of the walking legs are much less hairy.

The largest ♂ of Stat. 139 has a greatest width of carapace (between tips of posterior epibranchial teeth) of 15.5 mm. and a length of 11.75 mm., the ♂ of Stat. 267 is very slightly smaller, and the young specimen of Stat. 266 is only 5 mm. broad and 4.5 mm. long. This last specimen was found on a deep sea Sponge (a Hexactinellid); perhaps in youth the species leads a commensalistic existence.

The only "Challenger" specimen was dredged near the Fiji Islands, from a depth of 315 fathoms and was of about the size of my adult individuals.

Eucrate de Haan.

1835. *Eucrate* de Haan. Faun. Japon., Crust., p. 36.
1858. *Heteroplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94.
1903. *Platyozius* Borradaile. Faun. and Geogr. Maldive and Laccadive Arch., v. 1, p. 243.

In the fronto-orbital breadth not being much less than the greatest width of the carapace, the genus, with *Pilumnoplax*, differs from *Carcinoplax* and it allies (*Catoptrus*, *Libystes*), but it is distinguished among all others by the basal (or rather second) joint of the antennae excluding itself from the orbit by means of an acute process at its antero-external angle, which process is in contact with the inner suborbital lobe, and with the external angle of the front.

The anterior margin of the front is straight, slightly notched in the middle; the antero-lateral margins of the carapace are short and usually armed with four depressed, blunt teeth; the dactyli of the walking legs are long, slender and unarmed, those of the last pair are shorter, much depressed, spiny along the margins and wholly straight.

The genus *Heteroplax* with two species is very little known, but STIMPSON expressly states the excluding of the antennae from the orbits; for this reason DE MAN [1]) placed the genus near *Eucrate* and ALCOCK [2]) afterwards considered it identical with DE HAAN's genus.

1) Journ. Linn. Soc. London, v. 22, 1888, p. 89.
2) L. c., p. 298.

Miss RATHBUN [1]), however, maintains *Heteroplax* as a distinct genus and records both of STIMPSON's species from the Gulf of Siam, but without any comment whatever.

As to *Platyozius* it was first established by BORRADAILE as a subgenus of *Pseudozius*; afterwards [2]) it was declared to be nearer related to *Pilumnoplax*, but still regarded as belonging to the Xanthidae. Though it must be admitted that the limit between Goneplacidae and Xanthidae is largely arbitrary, the position of the male organs in such genera as *Pilumnoplax*, *Eucrate* etc. certainly points to the Goneplacidae, and I have associated *Platyozius* with *Eucrate*, on account of its general appearance, notwithstanding BORRADAILE's not mentioning anything about the antennae.

Five species in all are here included in the genus [3]), one of which has been dredged by the "Siboga".

Key to the species:

1. Margins of carapace without teeth or at most with two inconspicuous nodules. Chelipeds in ♂ very massive, longer than the walking legs . . . . . *E. hamiltoni* Mc Culloch [4])
   Antero-lateral margins of carapace four-toothed. 2
2. Front transversely grooved. Antero-lateral teeth of carapace all distinct, but the two middle ones on each side the largest . 3
   Second and fourth antero-lateral teeth nearly obsolete . . . 4
3. Large species (breadth of carapace 30—40 mm.); carapace much convex longitudinally, not sculptured, only with an oblique ridge on posterior teeth . . . . . *E. crenata* (de Haan) [5])
   Small species (breadth of carapace 15—20 mm.); carapace more flattened, with some short transverse ridges anteriorly; on the branchial regions at each side a more or less distinct, longitudinal ridge, laterally of which the carapace is strongly declivous. . . . . *E. sulcatifrons* (Stimpson)
4. Length of carapace to breadth as 1 : 1.27 . . . . . *E. dentata* (Stimpson) [6])
   Length of carapace to breadth as 1 : 1.46 . . . . . *E. transversa* (Stimpson) [7])

1. *Eucrate sulcatifrons* (Stimpson).

1858. *Pilumnoplax sulcatifrons* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 93.
1877. *Pilumnoplax sulcatifrons* Targioni-Tozzetti. Viag. "Magenta", Crost., p. 102, pl. 7, f. 2.

1) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, nº 4, 1910, p. 342.

2) L. c., p. 429.

3) The species *E. sexdentata* Haswell, mentiond by ALCOCK (l. c., p. 301), in reality belongs to the *Prionoplacinae* (*Homoioplax* Rathbun).

4) Rec. Austral. Mus., v. 7, 1908, p. 58, pl. 12, f. 1. Hab. Queensland.

5) *Cancer (Eucrate) crenatus* de Haan, Faun. Japon., Crust., 1835, p. 51, pl. 15, f. 1; *Eucrate crenata* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 688; RATHBUN, Proc. U. S. Nat. Mus., v. 26, 1903, p. 23. Hab. Japan.

6) *Heteroplax dentata* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, nº 4, 1910, p. 342; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 94. Hab. Hongkong and Gulf of Siam.

7) *Heteroplax transversa* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, nº 4, 1910, p. 342; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 95. Hab. Hongkong and Gulf of Siam.

1881. *Eucrate affinis* Haswell. Proc. Linn. Soc. N. S. Wales, v. 6, p. 547.
1881. *Pseudorhombila sulcatifrons* var. *atlantica* Miers. Ann. Mag. Nat. Hist. (5), v. 8, p. 259.
1882. *Eucrate affinis* Haswell. Cat. Austral. Crust., p. 86.
1884. *Pseudorhombila sulcatifrons* var. *australiensis* Miers. Zool. H. M. S. "Alert", Crust., p. 242, pl. 24, f. C.
1888. *Eucrate affinis* de Man. Journ. Linn. Soc. London, v. 22, p. 89, pl. 5, f. 5—7.
1900. *Eucrate crenata* and var. *affinis* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 300.
1903. *Platyozius laevis* Borradaile. Faun. and Geogr. Maldive and Laccadive Arch., v. 1, p. 243, textfig. 45.
1907. *Pilumnoplax sulcatifrons* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 90.
1910. *Eucrate crenata* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 340.
1911. *Eucrate crenata* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 237.

Stat. 114. Entrance of Kwandang Bay, north coast of Celebes. Depth 75 m. 1 ♂.
Stat. 162. West coast of Salawatti Island, north-west of New Guinea. Depth 18 m. 1 ♀.
Stat. 303. Haingsisi, Samau Island, south-west of Timor. Depth up to 36 m. 1 ♂.

The species *E. crenata* and *E. sulcatifrons* are so very much alike, that there may be no sufficient reason to separate them: both have the front transversely-sulcate, the same dentation of the carapace and the same characteristic patch of hairs at the distal end of the wrist of the cheliped. In Stimpson's species the carapace is somewhat less convex longitudinally and there is not only a short transverse ridge, parting from each posterior lateral tooth, but also a faint indication of two epigastric lobes, and the declivous parts of the branchial regions are marked dorsally by a beaded ridge, as mentioned by Stimpson, de Man and Alcock in his var. *affinis*.

If *E. crenata* and *sulcatifrons* are really identical and the latter only must be considered a young stage of the former, it remains unexplained why specimens of the Indian Ocean, as far as measurements are given, are constantly smaller than typical *crenata* specimens from Japan. I think it preferable, then, to keep the name *crenata* for the Japanese specimens, that grow to a large size, and to refer the much smaller specimens from the Indian Ocean to *E. sulcatifrons*.

By far the best description and figure of the latter species has been provided by de Man. Miers (1884) considered *Pilumnoplax sulcatifrons* identical with *E. affinis*, and described a new subspecies (*australiensis*), distinguished by the absence of a median notch in the front and by the distal end of the wrist of the cheliped not being furnished with a woolly patch. This latter character may be of no systematic importance, as Alcock in some specimens of *E. affinis* observed, that this woolly patch individually varies in extent.

Haswell's description is far from complete, but if de Man's identification is right, of which I have no doubt, the *Pilumnoplax sulcatifrons* of Stimpson is wholly identical with Haswell's species, for the American author (1907) expressly mentions "a slight longitudinal ridge or angle on each side above and parallel with the postero-lateral margin", and in the essential features his description perfectly tallies with de Man's.

In my specimens the transverse ridges parting from the base of each third antero-lateral tooth, as well as the faint elevation connecting these ridges with the epigastric lobes (de Man, p. 91), are absent, or almost so.

I think *Platyozius laevis* Borradaile is the same as our species, although the front is

not observed to be transversely sulcate, and exhibits "a broad, shallow bight in the middle" (no small, triangular notch), the hairy patch of the wrist is absent and the ambulatory legs are comparatively more slender than usual, but these differences may be accounted for, perhaps, by the very small size of the animal (length of carapace 5 mm.).

My ♂ specimens have a maximum breadth of carapace of 9.75 and 8.5 mm. and a length of 8 and 7 mm.; the ♀, that has lost the chelipeds, is 12 mm. wide and 9.5 mm. long. The abdomen of the latter sex exhibits nearly exactly the same, triangular shape as that of the ♂, but it is regularly tapering from the third segment to the terminal one, which latter is elongate-triangular; the tips of the elongate and slender pleopods project in a bunch from beyond the end of the abdomen. The first segment of the abdomen of the ♂ is unusually long and gradually widens towards the next segment, which is as broad as the third.

If my list of synonyms be right, the species extends over the whole Indian Ocean: from the Seychelles to the Mergui Archipelago, the Andamans, Suvadiva Atoll, Madras, and to the Gulf of Siam; it occurs at Hongkong, in the Moluccas, and at the coast of Australia (Port Denison, Port Molle), always in shallow waters of 20—40 fathoms depth. A subspecies *(atlantica)* has been described by MIERS (1881) from Goree Island (Senegambia).

Psopheticus Wood-Mason.

1890—91. *Psopheticus* Wood-Mason. Admin. Rep. Mar. Survey of India, p. 20 (nomen nudum).
1899. *Psopheticus* Alcock. "Investigator" Deep-Sea Brachyura, p. 72.

As ALCOCK remarks the genus is nearly related to *Carcinoplax*; indeed, it are the chelipeds, and more particularly the quadrate wrist with its acute external tooth, that are similar in both genera; as in *Carcinoplax* and *Pilumnoplax* the front is square-cut, overhanging the antennulae; and, as in *Pseudorhombila*, the dactyli of the last pair of legs are styliform, not depressed. The fronto-orbital breadth is usually nearly equal to the greatest width of carapace; the external orbital angle is strongly projecting, flattened, and at a considerable distance behind it there is one acuminate epibranchial tooth.

The three species show a distinct preference to the deeper parts of the ocean bottom, occurring mostly beneath the 100 fathoms line.

Key to the species:

1. Carapace subquadrate, width between external orbital angles about three-fourths the greatest breadth or nearly equal to it 2
   Carapace subcircular, with the lateral margins strongly arched; distance between external orbital angles about two-thirds the greatest breadth. Meropodites of walking legs with a single subdistal spine. First segment of abdomen of ♂ entirely covering the sternum and wider than second and third segment *Ps. hughi* Rathbun [1])
2. Distance between external orbital angles nearly equal to greatest

1) Proc. U. S. Nat. Mus., v. 48, 1914, p. 144. Hab. Philippine waters (near Northern Mindanao), in depths of 200—220 fathoms.

breadth of carapace. Anterior margin of meropodites of walking legs with a series of spines . . . . . *Ps. stridulans* Wood-Mason

Distance between external orbital angles about three-fourths the greatest width of the carapace. Anterior margin of meropodites of walkings legs with a single (subdistal) spine . . *Ps. insignis* Alcock [1])

1. *Psopheticus stridulans* Wood-Mason.

1892. *Psopheticus stridulans* Wood-Mason. Ill. Zool. "Investigator", Crust., prt 1, pl. 5, f. 1.
1894. *Psopheticus stridulans* Alcock. Ann. Mag. Nat. Hist. (6), v. 13, p. 402.
1899. *Psopheticus stridulans* Alcock. "Investigator" Deep-Sea Brachyura, p. 73.
1900. *Psopheticus stridulans* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 309.
1904. *Psopheticus stridulans* Doflein. Wiss. Erg. "Valdivia", Bd 6, Brachyura, p. 118, pl. 30, f. 4.

Stat. 38. 7° 35'.4 S., 117° 28'.6 E. North of Paternoster Islands, Bali Sea. Depth 521 m. [2]). 1 ♂.

It would not be worth while to give a new description of this species or to figure it again, for ALCOCK's diagnosis is rather complete and though I could not see the figure in the Ill. Zool. "Investigator", the photographic reproduction provided by DOFLEIN conveys an excellent idea of this deep-sea inhabitant. As my specimen happens to be considerably larger than those of ALCOCK (whose largest ♂ is only 20 mm. broad) some few remarks may be of use.

In the first place ALCOCK notes that the carapace is "crossed transversely in its posterior half by a broad groove which is continued obliquely across the pterygostomian regions to the angles of the mouth", and further remarks, that this groove which is sharply defined and of a red colour, divides the carapace into an anterior "livid red or almost violet" portion and a posterior one of a dusky red colour. I do not see anything of this kind in my specimen: there is no transverse groove at all, save the short, ill-defined cervical groove [3]), and the whole animal is of a uniform ivory-white colour.

Secondly it is true, that the suborbital and subhepatic regions in my specimen are somewhat inflated, but they are covered with very minute granules only, and do not constitute a "granular eminence" (ALCOCK).

The eye-stalks are short, but the cornea of the eye, which does not quite reach to the flattened, much prominent external orbital angle, is very large, rounded and forms, with the stalk, a hammer-shaped structure, as in *Hexaplax* Doflein. The upper orbital margin presents an obtuse prominence in the middle, the inferior margin is entire, finely beaded, and projects inwardly into a large, obtuse tooth, leaving a wide gap between it and the external angle of the front, which gap is partly filled by the antenna, the flagellum of which is nearly twice as long as the eye-stalk; the orbit itself is nearly as wide as the square-cut, overhanging front, beneath which the elongate antennulae are transversely folded.

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 310; Ill. Zool. "Investigator", Crust., prt 9, 1902, pl. 54, f. 2. Hab. Gulf of Martaban, in only 60—67 fathoms depth.

2) According to list of stations. On label in bottle a considerably greater depth is indicated (400—500 fathoms, about 720—900 metres).

3) Neither do I detect a distinct indication of this transverse groove in DOFLEIN's figure.

The chelipeds are not very unequal in my specimen, the right being only slightly the larger, and $2^1/_2$ times the length of the carapace. In DOFLEIN's specimen the fingers are much gaping at the base and present some few teeth only near the distal end, in the "Siboga" specimen, however, the fingers do not gape, the fixed one is deflexed and the cutting margin is provided all along with numerous triangular teeth, two of which are much the larger; the movable finger is less distinctly toothed and bears in the right chela, near the base, a large, obtuse tooth, directed backward. The margins of the palm are smoothly rounded off and the inner surface presents a deep, longitudinal impression near the under margin, especially conspicuous in the left chela.

The first pair of walking legs bears only a single, subdistal spine at the meropodites; the meropodites of the three following pairs present a series of five spines, and the anterior margin of the carpopodites is also spinous, though there is only a single spine in the case of the first and fourth pair. The dactyli are very elongate, thin and styliform, slightly curved and with some longitudinal rows of very minute hairs towards the horny tips. These minute hairs are indeed the only ones to be observed, as the whole animal is entirely naked.

The abdomen of the ♂ entirely resembles that of *Carcinoplax longimana* (de Haan); it is very short and broad, reaching forward only to the level of the anterior pair of walking legs; the first segment is partly concealed beneath the carapace, the second is strongly keeled transversely, and both segments do not quite cover the space between the bases of the last pair of legs, the third segment is broader and touches the coxopodites of the last pair of legs, the fourth to sixth segment gradually decrease in breadth, but increase in length, the last segment is very short, much shorter than broad. The first abdominal appendages are very strongly calcified and terminate in a short, acuminate tip.

Dimensions in mm.:

Distance between external orbital angles . .	23.5
Distance between tips of epibranchial teeth .	27.—
Anterior margin of front	7.75
Length of carapace	21.—
Length of right cheliped . . . . . about	61.—
Length of right chela	28.—
Length of penultimate pair of legs. . about	56.—

DOFLEIN gives the length of the cephalothorax as 62 mm., the breadth as 29 mm.; the first number must be certainly a misprint, and probably altered into 22; his figure seems to be twice enlarged.

This rare species has been firstly known from the Andaman Sea, where it was repeatedly dredged at depths between 173–419 fathoms. The "Valdivia" expedition caught it, at a depth of about 165 fathoms, S. W. of Great Nicobar Island (6° 54′ N., 93° 38′.8 E.).

The "Siboga" record is thus remarkable, as the first instance of the occurrence of the species outside the Andaman Sea, and, if the indication "400–500 fathoms" on the label be truly reliable, the vertical distribution of the species is also somewhat extended.

The large eye with its dark brown, almost black retina is worth noting in this deep sea species.

Litocheira Kinahan.

1858. *Litocheira* Kinahan. Journ. Roy. Dublin Soc., v. 1, p. 121.
1880. *Brachygrapsus* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 203.
1900. *Litochira* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 314.

The members of this genus are all very small and characterized, as has been rightly put forth by ALCOCK, by the front being turned down and arched, never lamellar and square-cut, mostly, if not always, bilobed anteriorly, and by the very long silky setae, fringing not only the carapace, but also the chelipeds and the walking legs. A row of very long setae is nearly always inserted across the front and continued on the eye-stalks; the carapace is mostly covered with shorter or larger hairs, but may be also naked and covered with granules; the various regions are indistinct; the chelipeds short.

The type of the genus which now includes even more species than *Carcinoplax*, is *L. bispinosa* Kinahan, an apparently common species of Australia and propably also occurring at New Zealand. All species are found in shallow waters.

ALCOCK divides the genus into two groups; one in which the carapace is broader than long, "as in KINAHAN's type", [1]) and another, in which it is nearly square. The material of the "Siboga", however, renders it impossible to maintain this mode of dividing the species, as there are gradual transitions.

The "Siboga" expedition yielded 6 species, 3 of which are new.

Key to the species:

1.	Antero-lateral margins of carapace distinctly toothed . . .	2
	Antero-lateral margins of carapace entire, faintly notched or inconspicuously angular behind external orbital angle . .	10
2.	Antero-lateral margins of carapace with 4 teeth in all; the external orbital angle is a broad, sharply-edged plate and incompletely fused with the next tooth, the two following ones are depressed, truncate and the last is small and subacute. Greatest breadth of carapace 1.4 times the length, the latter dimension equal to extent of fronto-orbital border	*L. ciliata* (Stimpson), *angustifrons* Alcock, *cristata* Rathbun [2])
	Antero-lateral margins of carapace with less than 4 teeth in all	3

1) The type species is, however, according to MC CULLOCH's figure (Rec. Austral. Mus., v. 9, n⁰ 3, 1913, p. 324, textfig. 42), but very little broader than long.

2) *Pilumnoplax ciliata* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94; Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 92. Hab. Simoda (Japan).

Litochira angustifrons Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 315; Borradaile, Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430. Hab. Bombay, Karachi and Male Atoll.

Litocheira cristata Rathbun, Proc. Biol. Soc. Washington, v. 22, 1909, p. 111; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n⁰ 4, 1910, p. 340, textfigs 25—26. Hab. Gulf of Siam.

These three species seem to have so much in common, that they may be perhaps really identical. In ALCOCK's and Miss RATHBUN's species the greatest breadth of the carapace is 1.4 times its length, in STIMPSON's *L. ciliata* considerably more (1.58 times its length) but on the other hand in *L. ciliata* the meropodites of the walking legs are crested anteriorly, in the same way as in *L. cristata*, in which, however, the crest of the last legs is found posteriorly; again these two species agree in having the arm of the cheliped sharply-edged and prominent near its distal end. Such mutual relations support the probability of the three species being really identical.

3.	External orbital angle prominent, spiniform	4
	External orbital angle not prominent, at most rectangular .	6
4.	Two sharp spinules behind external orbital angle. Meropodites of walking legs without spines	*L. beaumontii* Alcock [1])
	Meropodites of walking legs armed with a row of spines, save in the last pair of legs (or with a single spine). .	5
5.	Two spinules behind external orbital angle. Anterior margin of meropodites with several spines	*L. aranea* n. sp.
	One very large spine behind external orbital angle. Carapace nearly exactly quadrate, front deeply bilobed in dorsal view. Anterior margin of meropodites with only one subdistal spine	*L. kingsleyi* Miers [2])
6.	One spine behind external orbital angle	*L. bispinosa* Kinahan [3])
	Two spines or depressed lobes behind external orbital angle, sometimes followed by a minute third one	7
7.	Teeth of antero-lateral margins of carapace blunt. Greatest breadth of carapace about $1^1/_2$ times its length, the latter equal to width of fronto-orbital border	*L. setosa* (A. Milne-Edwards)
	Teeth of antero-lateral margins of carapace spiniform. Greatest breadth of carapace always less than $1^1/_2$ times its length	8
8.	Outer surface of palm of cheliped with longitudinal rows of large, pearly granules; a tuft of short hairs between bases of fingers. Width of fronto-orbital border equal to length of carapace	*L. sculptimana* n. sp.
	Outer surface of palm of cheliped smooth and glossy or with rather irregularly-arranged small granules beneath a short and dense fur; gap of fingers without hairs. Width of fronto-orbital border exceeding length of carapace. . .	9
9.	Antennae and some markings on the carapace (viz.: a horse-shoe shaped figure behind the front and some large spots on the epistome, the subhepatic and subbranchial regions) of a dark sepia-brown. Anterior margin of meropodites of walking legs with one or two spines	*L. quadrispinosa* Zehntner
	Antennae and carapace not coloured. Anterior margin of meropodites of walking legs wholly unarmed	*L. affinis* n. sp.
10.	Antero-lateral margins of carapace passing with an obtuse	

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 315. Hab. Andamans and Ceylon.

2) Rep. "Challenger", Brachyura, 1886, p. 232, pl. 21, f. 1; DOFLEIN, Wiss. Erg. "Valdivia", Bd 6, Brachyura, 1904, p. 121. STEBBING, Ann. S. Afr. Museum, v. 6, prt 4, 1910, p. 314. Hab. Agulhas Bank, near Cape of Good Hope.

3) Literature: MC CULLOCH, Rec. Austral. Mus., v. 9, n° 3, 1913, p. 323, textfig. 42. Hab. coasts of Australia (except perhaps the north coast), Tasmania and probably New Zealand (*Brachygrapsus laevis* Kingsley).

	angle into postero-lateral margins. Walking legs naked (?)	*L. glabra* Baker [1])
	Lateral margins of carapace regularly arched	11
11.	Carapace covered with a dense pubescence.	12
	Carapace not pubescent, smooth or granulate	13
12.	Length of carapace to breadth as 1 : 1.32, lateral margins not much convex, with three very faint notches or prominences in their anterior part	*L. subintegra* Lanchester
	Length of carapace to breadth as 1 : 1.45 (approximately), lateral margins much convex, with two inconspicuous notches in their anterior part.	*L. integra* (Miers) [2])
13.	Carapace smooth, breadth little exceeding its length, with traces of two faint notches on either side	*L. inermis* Borradaile [3])
	Carapace strongly granulate, especially on the hepatic regions, length to breadth as 1 : 1.25, no notches on lateral margins	*L. de charmoyi* Bouvier [4])

1. *Litocheira setosa* (A. Milne-Edwards). Pl. 1, Fig. 1.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 315.
RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 340.

Stat. 34. Labuan Pandan, east coast of Lombok. Depth 18 m. 1 ♀.
Stat. 53. Nangamessi Bay, north coast of Sumba. Depth up to 36 m. 1 ♂.
Stat. 127. Taruna Bay, Great Sangir Island, between Celebes and Philippines. Depth 45 m. 1 ♂, 2 ♀ (one with eggs).
Stat. 181. Ambon. Depth 36—54 m. 1 ♂, 2 ♀ (one of the latter with a parasitic Bopyrid in the left branchial cavity).
Stat. 240. Banda. Depth 9—45 m. 1 ♀ (with *Sacculina*).

The carapace of this species is for the greater part smooth and naked, without indication of regions, only the cervical groove being visible as a short, straight and shallow depression, terminating at either end into a semi-lunar concavity, which is beset with very short hairs. Similar hairs are found along the anterior and antero-lateral borders of the carapace and in the long median sulcus parting from the anterior margin of the front; among these hairs, at least near the suborbital and antero-lateral borders, numerous granules are freely scattered. The greatest breadth of the carapace varies between 1.4 to nearly 1.5 times its length and the fronto-orbital border is almost or quite exactly as long as this length, so that the lateral margins are conspicuously arched anteriorly. The external orbital angle is not prominent and behind it we find two prominences on the lateral margins, which prominences vary rather largely: sometimes they present the shape of two depressed teeth, the anterior somewhat larger

1) Transact. R. Soc. South Australia, Adelaide, v. 30, 1906, p. 110, pl. 2, f. 1, pl. 3, f. 3. Hab. South Australia.

2) *Carcinoplax integra* Miers, Rep. Zool. "Alert", 1884, p. 543, pl. 48, f. C; *Litochira integra* Alcock, Journ. As. Soc. Bengal; v. 69, prt 2, 1900, p. 314; BOUVIER, Bull. sc. France et Belgique, v. 48, 1915, p. 119, textfig. 34; LAURIE, Journ. Linn. Soc. London, v. 31, 1915, p. 464, pl. 45, f. 2. Hab. Seychelles, Mergui Arch., Mauritius, Red Sea. An *Litocheira integra* Borradaile, Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430?

3) BORRADAILE, Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430. Hab. Male Atoll.

4) Bull. sc. France et Belgique, v. 48, 1915, p. 121, textfig. 35, pl. 5, f. 8, pl. 6, f. 9. Hab. Port Louis (Mauritius).

than the next, and separated by rather deep notches, but as often they take the form of two spines only (fig. 1 *a*) and are in this case more difficult to be detected. Immediately behind the posterior tooth the carapace reaches it greatest breadth, and from this point the sharp lateral margin disappears altogether backward.

The external maxilipeds are rather broad, the merus is much shorter than the ischium, roughly quadrate, with the antero-external angle somewhat prominent and smoothly rounded; the exognath is narrow, its breadth attaining only a third of that of the ischium. The lateral borders of the buccal cavity are parallel.

The chelipeds are subequal in the ♀, but unequal in the ♂, the larger chela being found at the left in all the ♂ at hand. The meropodite is sharply edged at upper and inner border, but not serrate; the upper border presents a very indistinct prominence near its distal end, which scarcely can be called a tooth; the carpopodite is somewhat sharpened at the inner angle, but not produced, and for the most part smooth, only towards the anterior border we observe numerous granules, mostly scattered among very short hairs, and the same granules and hairs are found all over the outer surface of both palms in the ♀, and of the right palm in the ♂; towards the bases of the fingers the granules often show the tendency to arrange themselves in one or two longitudinal rows, which in the ♀ extend half-way up the fingers, the distal half of the fingers in both sexes is dark sepia-brown, smooth and naked, longitudinally grooved and roughly crenulate, especially so in the case of the lower finger; inner surface of palm and fingers perfectly smooth. The larger (left) palm of the ♂ (fig. 1 *b*) is for the greater part entirely smooth, and the usual granules and long setae, that cover the surface of the right palm, are here restricted to a small portion along the upper border, the lower finger is very short and high, tapering rapidly, the mobile finger is much longer, much curved (in the figure the tip of the finger is seen to be broken off), and the dark colour of the fingers extends here farther backward than is the case in the opposite finger. In young ♂ the outer surface of the left palm is still wholly covered with granules and hairs like that of the right, but with advancing age the smooth portion becomes larger and larger, the final stage apparently being attained at rather different sizes of the various individuals at hand [1]).

The walking legs are not very much elongate, the penultimate pair, which is the longest, being not quite three times the length of the carapace. All the legs are quite unarmed, but rather densely fringed along the margins, particularly so along the outer (anterior) border of carpo- and propodite and on the dactylus. The meropodites are four times as long as broad, the dactyli are nearly straight, longer than the preceding propodites, at least in the case of the middle pairs of legs, with the horny tip freely projecting and slightly curved.

The first and the third segment of the abdomen of the ♂ touch the coxopodites of the posterior legs; the abdomen of the ♀ is not very broad and resembles largely that of the other sex, though it is much more regularly tapering from the third to the seventh segment. The eggs are not very numerous and unusually large (0.57 mm. in diameter).

1) In this way it may be explained why A. MILNE-EDWARDS (Nouv. Arch. Mus. Paris, t. 9, 1873, p. 267, pl. 12, f. 2) describes the under part of the left palm as being finely granulate, whereas DE MAN (Arch. Naturgesch., Jahrg. 53. 1., 1888, p. 349) in a specimen of nearly the same size found the under part of this left palm quite smooth, though minutely pitted.

The species has been found in the following localities: New Caledonia, Mergui Arch., Banda, Noordwachter Island near Batavia, Andamans and Gulf of Siam.

Dimensions in mm.:	1 ♂	2 ♂	3 ♀	4 ♀	5 ♀
Breadth of fronto-orbital border . . .	5.3	4.4	6.05	5.06	4.6
Breadth of front	2.85	2.6	3.63	2.75	2.65
Greatest breadth of carapace	7.48	6.4	8.8	7.48	6.4
Length of carapace	5.3	4.4	6.0	5.06	4.5

N° 1, 4 and 5 are from Stat. 127 (n° 4 is egg-bearing), n° 2 is from Stat. 53, n° 3 is from Stat. 240 and bears a *Sacculina* beneath the abdomen. None of my specimens attains the size of those of MILNE-EDWARDS and DE MAN (breadth of carapace 9 mm. and more).

2. *Litocheira affinis* n. sp. Pl. 1, Fig. 2.

Stat. 66. South of Saleyer Island, Flores Sea. Depth 8—10 m. 1 ♀.
Stat. 315. Paternoster Islands, north of Sumbawa. Depth up to 36 m. 2 ♂.

This new species much resembles the preceding, but the fronto-orbital breadth is proportionately larger, there are always three spiniform teeth at either side of the carapace, excluding the outer orbital angle, the walking legs are more slender, the chelipeds nearly equal, the inner angle of the wrist is produced, and the left palm of the ♂ lacks the bare, smooth outer surface, so conspicuous in *L. setosa*.

The fronto-orbital border is always longer than the length of the carapace; the latter presents scarcely any trace of regions, and, besides with short and widely-separated setae, it is uniformly covered with numerous minute, squamiform granules, visible only on microscopical examination; these are particularly crowded on the eye-stalks. The shorter hairs near the suborbital and antero-lateral borders, found to a greater or lesser extent in *L. setosa*, are wholly absent, and the whole animal is of a dull, milky-white colour. The proportion of length to breadth is for the rest the same as in the preceding species.

As usual, the front is strongly deflexed, bilobed and provided with a continuous, transverse row of long, silky setae, while similar, but much shorter, hairs are inplanted on the eye-stalks (fig. 2 *a*). Contrary to what is found in *L. setosa*, there is a trace of a rectangularly-cut outer orbital angle, and at equal distances behind it we observe at either side three spiniform teeth, the anterior of which is the larger; between the external orbital angle and the anterior epibranchial tooth the margin is straight or slightly concave, and the distance between the tips of the anterior teeth is scarcely smaller than that between the tips of the next teeth, where the carapace is largest, so that the lines connecting at either side the tips of the anterior and posterior epibranchial teeth are subparallel; beyond the teeth the margins are blunt and converging somewhat backward.

The antennulae are comparatively longer and more slender than, and the last joint of the peduncle does not increase in thickness towards the distal end so conspicuously as, in *L. setosa*.

The external maxillipeds (fig. 2 *b*), which by the way are covered with the same squamiform granules as the carapace, are likewise more slender than in the preceding species; the merus is smoothly rounded off at its antero-external angle, not at all produced, the inner

margin of the ischium is serrate; the exognath is slender, measuring only one-half of the breadth of the ischium.

There is scarcely any difference in size between the chelipeds of the young ♂ and the ♀, but in the only apparently adult ♂ specimen the right (not the left, as in *L. setosa*) is somewhat larger; all the joints are covered with numerous flat granules, that are somewhat raised and sharpened on the outer surface of the palm. The meropodite is short, upper and inner border sharpened, the former much curved and entirely unarmed near its distal end, the inner border with 8—10 spinules; the inner angle of the wrist is sharpened, somewhat produced, the tip being directed forward; the palm is granulate at the outer surface, longer than high and longer than the fingers, upper and under border are rounded; the outer surface of the fingers is longitudinally grooved, and of a brown colour, but much less so than in the preceding species, the immovable finger wholly straight, conical, tapering to a fine tip, that is sharply curved upward, the movable finger is more curved towards the tip, granulate on the back; the cutting margins of both fingers are finely crenulate, in the case of the upper finger it is the first tooth, near the base, and in the case of the under finger the second, that is the largest (fig. 2 *c*).

The walking legs again much resemble those of the preceding species; the penultimate pair is 2.75 times as long as the carapace. The meropodites are wholly unarmed; four times as long as broad; the propodites are elongate, even those of the last pair of legs, and the dactyli are as long as the propodites, rather thick and conical, with the tip curved, free from setae and of a horny colour; in the case of the last pair of legs the dactyli are armed with some minute spines near the end of the outer border and also with a few spinules at the inner side, near the tip (fig. 2 *d*).

The first segment of the abdomen of the ♂ wholly covers the space between the coxopodites of the last pair of legs, the second segment is narrower and the third again as broad as the first; from here the abdomen gradually tapers towards the tip. All the segments are very distinctly separated.

Dimensions in mm.:

		♂	♀
Fronto-orbital distance		4.2	4.6
Breadth of front		2.2	2.4
Greatest breadth of carapace		5.4	6.3
Length of carapace		3.75	4.3
Length	of penultimate pair of legs	10.5	—
Length of meropodite		3.5	—
Breadth of meropodite		0.85	—
Length of propodite in the median line		2.4	—
Length of dactylus		2.4	—

3. *Litocheira quadrispinosa* Zehntner. Pl. 1, Fig. 3.

1894. *Litocheira quadrispinosa* Zehntner. Rev. Suisse Zool., v. 2, p. 171, pl. 8, f. 11.
1900. *Litochira quadrispinosa* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 316.

Stat. 53. Nangamessi Bay, north coast of Sumba. Depth up to 36 m. 1 ♂.
Stat. 131. Karakelang, Talaut Islands. Reef. 1 ♀.
Stat. 193. Sula Besi, Sula Islands. Reef. 1 ♂.
Stat. 248. Tiur Island, between Ceram and Kei Islands. Reef. 1 ♂.

This species is easily recognisable by the dentation of the antero-lateral borders, by the rows of spines on the meropodites of the walking legs and by the characteristic dark markings on the body. These features are so reliable that I do not doubt of the identity of my specimens with ZEHNTNER's species, which, for the rest, was founded on a young ♀ only, but nevertheless they do not in all respects answer to description and figure of the Swiss author.

The convexity, or rather the depression, of the carapace and the covering of the long, silky and transparent setae are the same as in the other species of *Litocheira*. The only trace of regions to be detected is the long concave cervical groove, otherwise the carapace is smooth, sparsely covered with setae, that become larger towards the orbits and the front, and with widely-separated granules. Very characteristic are some dark markings on the lightly-yellow carapace, as has been put forth by ZEHNTNER and ALCOCK: firstly there is a most conspicuous horse-shoe shaped spot behind the front, the lateral parts of which spot vary in thickness in different individuals: in the largest ♂ (Stat. 248) this figure assumes the shape of two obliquely-longitudinal, pear-shaped, large blotches, contiguous at their anterior end; further, similar, but much more irregular markings extend along the antero-lateral margins of the carapace, on the subhepatic and subbranchial regions, on the epistome and on the under side of the eye-stalks, but their distribution varies much individually, and again in the ♂ of Stat. 248 they are the most developed. ZEHNTNER mentions and figures traces of epigastric lobes, which were, however, absent in my individuals.

The front is not so much deflexed as in the preceding species, so that the deep sinus, dividing the anterior margin into two obliquely-sloping lobes may be largely detected in dorsal view of the carapace; these lobes are, however, much more distinct in anterior view of the animal and it is then stated that each of them projects in a sharp angle near the lateral end. The supra-orbital border is twice emarginated by a triangular notch, one situated in the middle and the other quite near the outer orbital angle; the fronto-orbital border is very large, occupying 0.8—0.9 of the greatest breadth of the carapace, not including the antero-lateral teeth. The outer orbital angle is a small, obtuse lobe, not projecting beyond the level of the supra-orbital border, and not so sharp and prominent as shown in ZEHNTNER's figure. Behind this angle the margin is very deeply concave, then turns forward again to form the first antero-lateral tooth, which, like the slightly smaller second, is large, spiniform, turned straight forward in its distal half and reaching nearly to the level of the outer orbital angle; the distance between the tips of the second pair of teeth is scarcely greater than that between the first pair. Behind the last teeth the margins are obsolete, subparallel to each other, then slightly converging towards the base of the second pair of walking legs.

The antennulae are rather short and thick; the last joint of the peduncle greatly increases in bulk towards the distal end, as in *L. setosa*. The flagellum of the antenna is long, measuring

more than twice the length of the eye-stalk, but not as long as the carapace (ZEHNTNER) and the greater part of the 17 joints of which it is composed bears a wreath of several long setae, similar to those of the carapace and the legs. The flagellum is rendered conspicuous by the same sepia-brown colour as shown by the various markings of the carapace, this hue may be, however, absent on account of its having been extracted by alcohol. The external maxillipeds (fig. 3*a*) are more slender than in the two preceding species, but otherwise very much alike to those of *L. affinis*: the antero-external angle of the merus is rounded, rectangular, not at all prominent; the exognath measures near its base not yet one-half of the breadth of the ischium. The lateral margins of the buccal cavern are parallel.

The chelipeds are unequal in the adult, the left being the larger, as in *L. setosa*, both in the ♂ and in the ♀; in the ♂ figured here (Stat. 193) only the left cheliped is present, but this happens to be unusually small and the ratio may here have been the reverse. According to ZEHNTNER they are equal (in ♀). The short meropodite is sharply-edged at upper and particularly at inner border, the former is armed with a strong, curved tooth near the distal end, preceded in the proximal half of the border by a series of much smaller spines, and similar spines are found in a single file along the inner border of both ischio- and meropodite; the outer surface of the latter is granulate, like upper portion of wrist and outer surface of palm. Inner angle of wrist sharply produced, turned forward. Both in the larger and in the smaller chela, but more distinctly so in the latter, the granules of the outer surface present the tendency of arranging themselves in longitudinal rows, but it is remarkable, that in the unusually small chela here figured (fig. 3*b*) nothing of this kind is observed, the palm is longer than the fingers and the borders are rounded. Near the base of the immovable finger of the large chela and along the under border, in the case of the adult specimens, the same perfectly smooth, naked, ivory-white portion is developed as has been described in *L. setosa*. Also with regard to the fingers the two species resemble each other: the immovable finger of the large chela is perfectly straight, save the curved, acuminate tip, very high at the base and rapidly tapering, the opposite finger is granulate on the back, near the base, faintly curved in the proximal two-thirds, more strongly so towards the tip, the cutting margins of both fingers are roughly crenulate; in the right chela the fingers are somewhat lower at the base and the crenulations are sharper, turned forward and decreasing from base to tip of the inner margin (see also ZEHNTNER's figure 11*b*); in both chelae the fingers are coloured generally a chestnut-brown, but in the ♀ of Stat. 131 they are simply ivory-white, like the apparently discoloured antennae.

The strong walking legs afford nothing remarkable but the characteristic spines on the meropodites. The number and disposition of these spines offer individual variations, but in the adult ♂ of Stat. 248 I observe the following: the anterior margin of the first to third pair inclusive ends in a spine and, besides, in the distal half of the first and second pair again two spines, close to one another, are found, the distal one of which is the larger, the third pair bears only a single spine at the beginning of the distal third of the margin; the meropodites of the fourth pair finally are entirely unarmed. Among the long setae fringing the anterior margins of all the meropodites some long, feathered hairs are to be observed.

The posterior margin of the meropodites of the first pair are armed in their distal half with a row of 6—7 spines, the penultimate of which is by far the larger; in the middle third of the same margin of the second pair three much smaller and widely-separated spinules are found; the meropodites of the two following pairs are entirely spineless. In the adult ♀ (Stat. 131) all the spines are less in number.

The dactyli of the posterior legs show several spines near the horny, transparent tip, similar to, but longer than, those of *L. affinis*.

The third segment of the abdomen of the ♂ (fig. 3*c*) reaches as far outward as the first; the second is only slightly narrower.

ZEHNTNER's specimen (a ♀) came from Amboyna. ALCOCK records a specimen from the Andamans.

Dimensions in mm.:		♂	♂
Width of fronto-orbital border		4.6	5.6
Breadth of front		2.2	2.4
Greatest breadth of cacapace (between tips of post. epibranchial teeth)		5.5	6.—
Length of carapace		3.75	4.85
Breadth at the level of bases of anterior pair of walking legs		4.95	5.5
Length of meropodite	of penultimate pair of legs	3.5	—
Breadth of meropodite		1.—	—
Length of carpopodite along anterior margin		1.65	—
Length of propodite along anterior margin		1.85	—
Breadth of propodite		0.7	—
Length of dactylus		2.—	—

The first ♂ measured is the one here figured (Stat. 193), the second from Stat. 248.

4. *Litocheira aranea* n. sp. Pl. 2, Fig. 1.

Stat. 144. Salomakieë, near south point of Halmaheira. Depth 45 m. 1 ♂ juv.
Stat. 250. Kur Island, Kei Islands, Depth 20—45 m. 1 ♂.
Stat. 285. South-east coast of Timor. Depth 34 m. 1 ♀.

This species is readily distinguished by the long, slender, spider-like and spinulous walking legs and by the narrow external maxillipeds.

The carapace is decidedly broader than long, but less so than in *L. quadrispinosa*, the ratio of length to greatest breadth being 1 : 1.25—1.3 and in the preceding species 1 : 1.35—1.45. The fronto-orbital border in the present species is also broader than the length of the carapace. The latter itself is more convex than in *L. quadrispinosa* and covered with numerous soft setae; these are, however, shorter than usually is the case: in the ♂ here figured (Stat. 250) the hairs are very inconspicuous and short, even on the surface of the front, in the ♀ they are longer, but not arranged in a distinct transverse row across the front. Regions are scarcely to be made out, only the cervical groove being visible, but behind the front traces of two epigastric lobes, separated by a longitudinal furrow, that bifurcates backward, may be seen. For the rest the whole surface of the carapace seems to be smooth. The front is strongly deflexed; the anterior margin is bilobed, though this is scarcely visible in dorsal view;

the lobes are separated by a broad, triangular notch and, in anterior view, much sloping dorsally and backward towards the lateral angles, where a slight prominence is found. The upper margin of the orbit is obliquely sloping backward, somewhat convex (fig. 1 *a*), not notched as in the preceding species; the external orbital angle projects in the form of a small, curved tooth, with the tip curved forward, a little way behind it an exactly similar tooth is found and at a smaller distance than that between the first and the second a third much smaller tooth is observed. In the adult ♂, that is smaller than the ♀, these lateral teeth are proportionately stronger than in the adult ♀ (compare figs 1 and 1 *a*). The lateral margins of the carapace are nowhere sharpened, not even in the neighbourhood of the teeth; their course is convex, but the breadth of the carapace between the external orbital angles is exactly the same as that at the level of the penultimate pair of legs.

The antennae are strong, the flagella composed of about 13—17 joints; in the ♂ each of these joints, except several of the distal ones, is very little hairy, in the ♀ they bear a wreath of very long setae. The last joint of the antennular peduncle is thick, not increasing much in size towards the distal end. The epistome is pushed far backward, especially in its central portion, the free margin nearly vertical; lateral margins of buccal cavern parallel. External maxillipeds characteristically elongate, the long axis of the ischium nearly twice its breadth (fig. 1 *b*), antero-internal angle of ischium projecting, merus roughly elliptical, much shorter and narrower than ischium, lateral and anterior margin forming a regular curve without interruption, carpus very broad and implanted at distal extremity of merus; exognath slender, half as broad as ischium.

Chelipeds short, of equal size in the ♂. Outer border of meropodite finely serrate, outer surface granulate, inner border with one spine, two proximal ones being placed on the inner margin of the ischiopodite, upper border with four smaller spines, increasing in size distally. Wrist finely granular at upper surface, inner angle with a sharp tooth, directed forward, beneath this tooth and placed farther backward a similar, but smaller tooth is observed, antero-external border of wrist with two sharp teeth. Chela (fig. 1 *c*) rather high in the ♂, with scattered granules at outer surface, upper and under border rounded; fixed finger high at the base, greatly compressed and keeled below, with four wing-like expansions, separated by curved furrows, at the inner margin, the last crenulation being as large as the faintly curved tip of the finger; movable finger greatly curved in its distal half, not compressed, and with two or three faint crenulations at the inner margin.

The walking legs are much elongate, so that the specific name *aranea* seems appropriate; penultimate pair more than three times the length of the carapace. Meropodites slender, not narrowing distally, more than five times as long as broad, and spinous along anterior margins. In all the legs this margin ends in a spine; besides, in the first pair of legs there are two spines on the distal half of the margin, in the second pair three or four spines are placed at equal distances, in the third a group of three very small spines are placed near one another in the proximal half and two much larger ones in the distal portion, the last pair

finally presents no spines save the very small distal one. In all the legs the anterior margin of the carpopodite ends in a distinct spine. In the middle pairs of legs the propodites are greatly elongate, being four times as long (in the median line) as broad, but the dactyli of these legs are even longer than the preceding joints, conical and straight for the greater part. All the dactyli are spinous near the horny, transparent tip.

The abdomen of the ♂ (fig. 1*d*) does not taper so much from the third segment to the tip and is on the whole shorter than in the preceding species.

Dimensions in mm.:

		♂	♀
Breadth of fronto-orbital border		3.75	5.3
Breadth of front		1.85	2.75
Greatest breadth of carapace (behind post. lateral teeth)		4.3	6.4
Length of carapace		3.3	5.1
Length	of penultimate pair of legs	10.5	—
Length of meropodite	of penultimate pair of legs	3.5	—
Breadth of meropodite	of penultimate pair of legs	0.65	—
Length of carpopodite along anterior margin	of penultimate pair of legs	1.75	—
Length of propodite along anterior margin	of penultimate pair of legs	2.2	—
Breadth of propodite	of penultimate pair of legs	0.5	—
Length of dactylus	of penultimate pair of legs	2.4	—

N° 1 is the ♂ (here figured) from Stat. 250, n° 2 the ♀ from Stat. 285.

5. *Litocheira sculptimana* n. sp. Pl. 8, Fig. 2.

Stat. 51. Madura Bay, west coast of Flores. Depth 54—90 m. 12 ♂ (all but one juv.), 6 ♀ (3 egg-bearing).

Stat. 260. 5° 36′5 S., 132° 55′2 E. North west of Kei Islands. Depth 90 m. 1 ♂, 3 ♀ (one egg-bearing).

This remarkable species is at once characterized by its finely sculptured chelae, by the lobelike antero-lateral teeth of the carapace and by the serration of the meropodites of the ambulatory legs.

The fronto-orbital breadth is nearly exactly equal to the length of the carapace and twice the breadth of the front; front and eye-stalks together occupy nearly the whole greatest breadth of the carapace (80—90 °/₀ of the latter), so that the carapace is almost quadrate, much more so than in all other known species of *Litocheira*.

The carapace is not much depressed, but vaulted both in longitudinal and transverse direction, smooth, of a dull, milky-white colour, without indications of regions, a straight, cervical groove, bifurcating at each end, being the only furrow; immediately before the cervical groove two spots of a chalky white are observed. The whole surface is covered with the usual long setae, so characteristic of the genus; these setae are particularly long anteriorly; the orbits are connected across the front with a straight row of such setae, that are arranged in two bunches, the middle setae in each of them projecting the most.

Beyond this transverse row, the front is perpendicularly deflexed, presenting a distinct, but shallow median sulcus, but the anterior margin is not at all bilobed, in anterior view it

is only somewhat wavy, straight in the middle and sloping regularly towards the lateral angles, which are subrectangular. The inner and upper orbital margin are regularly curved, entire, not notched, and the external angle is not at all prominent.

The eye-stalks are very thick, cylindrical. Lateral margins of the carapace in their anterior third part transformed into two depressed, broadly-triangular lobes, terminating in a small cup, directed straight forward in the first and obliquely in the second lobe, between the tips of the latter the carapace reaches its greatest breadth, which, however, as has been said, only slightly exceeds the fronto-orbital width; behind the second lateral lobe, the lateral margins of which are strongly converging backward, a third, very minute, tooth is found and then the lateral margins disappear altogether and the carapace is regularly narrowing backward. Posterior margin convex.

The antennae are slender, the flagella scarcely hairy. Peduncle of antennulae rather long, last joint much increasing in thickness towards the distal end; hairs of flagellum generally of a smoky or dusty colour which contrasts much against the dull-white colour of the animal. Epistome large, sunk, with the hind part vertical. Lateral margins of buccal cavern parallel. External maxilipeds broad, completely closing the buccal cavity (fig. 2*a*); ischium only little longer than broad, with the antero-internal angle rounded and the inner margin entire, not crenulate, and wholly hairless; merus short, only slightly longer than half the length of ischium, but quite as broad as the latter, owing to the antero-external angle being strongly expanded, much more so than in any other species of *Litocheira* that I know of; exognath nearly one-third as broad as ischium.

Chelipeds subequal and in the ♀ as fully developed and large as in the ♂. Meropodite short, with all three borders sharpened, inner and outer border finely serrate, outer surface rugose, upper border entire, but with one very strong, triangular tooth near the distal end. Wrist with sharp granules above, inner surface flattened, provided at ventral margin with a series of fine serrulations and terminating distally into a slightly depressed, triangular tooth, the tip of which is curved forward. Palm (fig. 2*b*) very characteristically sculptured and affording the best means of distinguishing the species at first glance: outer surface with five, obliquely-longitudinal rows of sharp granules; the upper row near the somewhat keeled and overhanging border of the palm is the broadest, but also the shortest, and between these rows the surface of the palm is perfectly smooth and glossy; under border of palm very sharply keeled in its proximal third part, more distally this keel passes into a row of fine crenulations, continued on the outer surface of the palm and the fixed finger till nearly to the tip, these crenulations are accompanied in their proximal portion by closely-set, very short, brown hairs; inner surface of chela smooth for the greater part, but in its ventral part provided with two longitudinal rows of granules, the inferior row being much the larger and continued till the tip of the immovable finger; under border of the latter granulate, straight, tip slightly curved upward, height of finger remaining almost the same in its proximal half, where at the outer side of the cutting margin a sharp, concave and prominent keel is found, distal portion of finger rapidly tapering to tip and with three crenulations, the proximal two being very large, wing-like; mobile finger regularly curved, the whole back occupied by

numerous rows of sharp granules and the long setae fringing the upper border of the palm continued to the tip of the finger, cutting margin flattened in its proximal portion and accompanied at the outer side by a long prominent keel, similar to that of the immovable finger, distal part of cutting margin with four teeth, alternating with those of the other finger, and diminishing in size towards tip of finger; base of fingers gaping, the gap being filled with four bunches of stiff hairs, one being placed on the palm, one on the fixed finger, and the two remaining ones on the other finger.

The walking legs are slender, but not very long, the penultimate pair being not yet twice as long as the carapace. The meropodites are four times as long as broad, and finely crenulate along both margins; anterior margin of carpo- and propodite armed in the same way. Dactyli longer than propodites; conical, nearly straight, armed along both margins with largely-separated spines.

The abdomen of the ♂ (fig. 2*c*) is much narrower than that of any other species of *Litocheira*: though the first and third segment exactly reach as far outward as to touch the coxopodites of the last pair of legs, the fourth, fifth and sixth segment do not taper at all, their lateral margins being parallel, these segments are subequal in length and the length is about half the breadth in each case; the terminal segment is broader than long and broader than the preceding segment, its outline is about three-quarters of that of a circle. The abdomen of the ♀ is likewise narrow, though of course broader than in the ♂; it narrows very gradually from the third segment to the terminal one, which latter is semi-elliptical and twice as long as the preceding. The eggs are comparatively few in number and rather large, their diameter varying from 0.35 to 0.4 mm.

Dimensions in mm.:	1 ♂	2 ♂	3 ♂	4 ♀ with eggs
Breadth of fronto-orbital border	3.85	3.5	2.4	4.6
Breadth of front	2.1	1.85	1.2	2.4
Greatest breadth of carapace	4.4	4.2	2.85	5.85
Length of carapace	3.9	3.5	2.45	4.8
Base of abdomen	—	1.1	—	—
Length of meropodite	—	2.—	—	—
Breadth of meropodite	—	0.48	—	—
Length of carpopodite along anterior margin of penultimate pair of legs	—	1.—	—	—
Length of propodite along anterior margin	—	1.2	—	—
Length of dactylus	—	1.55	—	—
Horizontal length of chela	—	3.3	—	—
Height of palm	—	1.85	—	—

N° 1 and 3 are from Stat. 51, n° 2 (the ♂ here figured) and 4 are from Stat. 260.

6. *Litocheira subintegra* (Lanchester). Pl. 16, Fig. 1.

1888. *Carcinoplax integer* de Man nec Miers. Journ. Linn. Soc. London, v. 22, p. 93.
1900. *Litochira integra*? Alcock. Journ. As. Soc. Bengal, v. 69, prt. 2, p. 314.
1900. *Carcinoplax subinteger* Lanchester. Proc. Zool. Soc. London, 1900, p. 750, pl. 46, f. 9.

Stat. 153. 0° 3'.8 N., 130° 24'.3 E. Near north-west point of Waigeu Island. Depth 141 m. 1 ♂.

It is with some diffidence that I refer the specimen at hand to the present species. Three species have been described with the lateral margins of the carapace entire and unarmed or nearly so, viz. *L. integra* (Miers), *L. subintegra* (Lanchester) and *L. inermis* Borradaile [1]). The latter may be easily distinguished by the carapace being almost square, smooth, hairless and microscopically pitted, but as to the remaining species, which both are covered with a short, dense fur, it is not at all certain whether they are really distinct. Laurie [2]), who records *L. integra* from the Red Sea, apparently does not accept Lanchester's species and Bouvier [3]) identifying a specimen from Mauritius with Miers' species, mentions Borradaile's view [4]) about the distinctness of the two forms, but does not venture to express any definite opinion about the question.

Unfortunately the information of Miers [5]) about his "*Carcinoplax*" *integra* is not very exhaustive, and about one important point, viz. the ratio of the length of the carapace to its breadth, there is a discrepancy, as Laurie rightly puts forth, between text and figure, the former giving this ratio as 1 : 1.25 and the latter as 1 : 1.5. Leaving this aside, Bouvier describes a specimen of exactly the same dimensions as those of Miers, and most likely identical with the species, as being provided on the hepatic regions with sharp granules, projecting in an irregular way beyond the outline of the carapace.

Borradaile, who records *L. integra* from Hulule, Male Atoll, enumerates the following points, by which *L. subintegra* is distinguished: three, instead of two, faint notches, on the antero-lateral margin, external orbital angle almost right, not obtuse, front narrower.

Taking as base Miers' figure, which is probably reliable, and with which both Laurie's and Bouvier's examples are expressly stated to agree completely, the specimen of the "Siboga" is certainly not identical with *L. integra*, for the ratio of the length of the carapace to its breadth varies, according to Miers and Laurie, between 1 : 1.5—1.4, so that the carapace is decidedly broader than in my specimen (length to breadth as 1 : 1.32, viz. exactly the same as in de Man's specimen [6]) which is identified by Lanchester with *L. subintegra*). The width of the fronto-orbital border is also greater than in the five specimens of Laurie (0.83 of the greatest breadth in my specimen, and only 0.7 in those of Laurie).

The whole carapace is densely covered with a short fur, but, when this is removed, there is nothing to be seen of the sharp granules on the hepatic regions, as mentioned by Bouvier in *L. integra*; indeed the carapace is everywhere entirely smooth. The lateral margins are little arched, and provided in their anterior part with three extremely-minute angles, which hardly can be called prominences, the anterior of which, however, is by far the most distinct [7]). The front is distinctly bilobed and measures 0.44 of the greatest breadth of the carapace (nearly

1) Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430, textfig. 111. Hab. Hulule, Male Atoll.

2) Journ. Linn. Soc. London, v. 31, 1915, p. 464.

3) Bull. sc. France et Belgique, v. 48, 1915, p. 119.

4) L. c., p. 430.

5) Zool. H. M. S. "Alert", 1884, p. 543, pl. 48, f. C.

6) From Lanchester's measurements it results, that here the ratio is respectively 1 : 1.4, 1 : 1.24, 1 : 1.25 and 1 : 1.25. Save in the first instance, which rather points to *L. integra*, this ratio better agrees with those found by de Man and by myself.

7) Lanchester figures three notches at each antero-lateral margin of the carapace, thus marking off four lobe-like teeth, which are scarcely or not all prominent, and the margins themselves are much much more strongly arched.

exactly one-third in LAURIE's specimens of *L. integra*). This fact is in contradiction te BORRADAILE's statement, that the front in LANCHESTER's species is narrower than in *L. integra*.

The external maxillipeds agree with MIERS' figure, the antero-external angle of the merus is rounded and not prominent.

The chelipeds are equal in my specimen; the meropodite is not armed at the upper border; the wrist is granulate above, produced at the inner angle; the outer surface of the palm is likewise finely granulate; the fingers are as long as the palm, not compressed, gaping, strongly curved towards the tips, finely crenulate at inner margins, and of a light sepia-brown in their distal portion.

The walking legs are slender, the penultimate pair measuring more than $2^1/_2$ times the length of the carapace; the propodites elongate, as long as the dactyli; the latter are of the usual shape in *Litocheira*, not spined near the tip. DE MAN says that the dactyli of the last legs are slightly curved, upward, "both in this species and in *C. setosus*, the same way as in the genus *Pilumnoplax*" and this is indeed observed to be the case, if the dactylus is viewed from behind.

Though the negative evidence of my specimen being not identical with *L. integra* is, in my opinion, beyond question, there is, it must be admitted, none the more probability that my identificating the specimen with *L. subintegra* is right, my only argument being that the animal apparently agrees with that of DE MAN, and LANCHESTER expressly states that specimens from the very locality (Mergui Arch.) whence DE MAN got his material, agree with his (from Singapore or Malacca).

Dimensions in mm.:

Breadth of fronto-orbital border	3.75
Breadth of front	1.98
Greatest breadth of carapace	4.5
Length of carapace	3.45

Libystes A. Milne-Edwards.

1867. *Libystes* A. Milne-Edwards. Ann. Soc. Ent. France (4), t. 7, p. 285.
1868. *Libystes* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 83.

This genus, together with the following, is nearly related to *Carcinoplax*, on account of the carapace being transversely-oval and the fronto-orbital border being far less than the greatest width. On the other hand there is even a greater resemblance to the Portunidae, as will be explained in discussing the genus *Catoptrus*.

The differences enumerated by ALCOCK between *Libystes* and *Catoptrus* are of no special importance; the type species of each genus indeed differ widely by the carapace being entire at its antero-lateral margins in *L. nitidus* and toothed in *C. nitidus*, but in *L. edwardsi* Alcock we have a remarkable transitional form with the carapace toothed entirely as in *Catoptrus*. Neither is the form of the merus of the external maxillipeds (greatly produced at antero-external angle in *Libystes*, only slightly so or not at all in *Catoptrus*, according to ALCOCK) of importance,

as in one species of the latter genus they are shaped entirely as in *Libystes*. Indeed I see no reason, judging from the evidence available, to maintain the genus *Catoptrus* (which is of a later date), but yet I shall keep the genera separated, because I had no opportunity of examining a species of *Libystes*.

Key to the species:

1. Margins of carapace entire, unarmed. Last two joints of posterior pair of ambulatory legs not paddle-like . . . 2
   Margins of carapace toothed anteriorly. Last two joints of posterior pair of ambulatory legs paddle-like, apparently adapted for swimming . . . . . *L. edwardsi* Alcock [1])
2. Carapace subquadrilateral . . . . . *L. alphonsi* Alcock [2])
   Carapace elliptical . . . . . *L. nitidus* A. Milne-Edwards [3]).

Catoptrus A. Milne-Edwards.

1870. *Catoptrus* A. Milne-Edwards. Ann. Sc. Nat. (5), t. 13, p. 82.
1888. *Goniocaphyra* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 339.

This genus does not belong to the Catometopous Crabs, as has been lately proved by BORRADAILE [4]), who rightly ranged it among the Portunidae, in the vicinity of *Carupa*, and instituted a new subfamily (*Goniocaphyrinae*), apparently then in ignorance of DE MAN's statement [5]) that *Goniocaphyra truncatifrons* is identical with *Catoptrus nitidus*; already DE MAN regarded his genus as belonging to the Portunidae. It is true, that the most characteristic feature of the Portunidae, the paddle-like transformation of the last two joints of the posterior legs, is absent in *Catoptrus* [6]), but on the other hand the form of the carapace, the toothing of the antero-lateral margins, the elongated chelipeds, the shape of the abdomen of the ♂ (broadly-triangular, with all but the last two segments fused) and last, but not least, the peculiar lobes at the first maxillipeds, so characteristic of the Portunidae, are likewise present in *Catoptrus*, as has been already shown by BORRADAILE [7]). These lobes, as is shown in the figure, form two rather thick membranous expansions at the inner side of the endopodite of the first maxilliped (Pl. 9, fig. 3*c*, *a*).

Though thus the systematic place of the genus is doubtless established among the true swimming-crabs, I have in the present paper retained *Catoptrus* among the Goneplacidae, where it is closely related to *Carcinoplax*.

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1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 306; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 61, f. 1. Hab. Persian Gulf and Andamans.

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 306; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 61, f. 2. Hab. Andamans. This species, though only known by a single young specimen, is probably identical with *L. nitidus*.

3) Nouv. Arch. Mus. Paris, t. 4, 1868, p. 83, pl. 20, f. 5—7; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 297. Hab. Zanzibar and Djibouti.

4) Proc. Zool. Soc. London, 1900, p. 577.

5) Notes Leiden Mus., v. 12, 1890, p. 67.

6) *Libystes*, which is certainly very closely related to *Catoptrus*, presents such swimming paddles in the species *L. edwardsi* Alcock.

7) Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 425, textfig. 110.

Key to the species:

Ratio of length of carapace to greatest breadth (posterior teeth not included) 1 : 1.4—1.5, antero-lateral teeth decreasing in size from external orbital angle to penultimate tooth. Merus of external maxillipeds longer than broad, slightly produced at antero-external angle . . . . . *C. nitidus* A. Milne-Edwards.

Ratio of length of carapace to greatest breadth as 1 : 1.7—1.8, middle antero-lateral teeth somewhat larger than the other ones. Merus of external maxillipeds broader than long, with the antero-external angle greatly produced . . . . . *C. inaequalis* Rathbun.

1. *Catoptrus nitidus* A. Milne-Edwards. Pl. 9, Fig. 4.

1870. *Catoptrus nitidus* A. Milne-Edwards. Ann. Sc. Nat. (5), t. 13, p. 82.
1888. *Goniocaphyra truncatifrons* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 339, pl. 14, f. 1.
1890. *Goniocaphyra truncatifrons* (= *Catoptrus nitidus*) de Man. Notes Leiden Mus., v. 12, p. 67.
1894. *Catoptrus nitidus* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 687.
1894. *Goniocaphyra* sp. Zehnter. Rev. Suisse Zool., t. 2, p. 163, pl. 8, f. 12.
1900. *Catoptrus nitidus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 307.
1900. *Goniocaphyra truncatifrons* Borradaile. Proc. Zool. Soc. London, 1900, p. 577.
1906. *Catoptrus nitidus* (part) Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 422.
1911. *Catoptrus nitidus* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239.

Stat. 144. Salomakiëe Island, south of Halmaheira. Depth 45 m. 1 ♂ juv.
Stat. 154. 0° 7'.2 N., 130° 25'.5 E. North of Waigeu Island. Depth 59—83 m. 1 ♂.

Laurie has taken the trouble of comparing his specimen most attentively with those of Alcock and de Man and with the type specimen of *C. inaequalis* and concludes, that Miss Rathbun's species most probably is a synonym of the present one. He adds that Miss Rathbun's photograph "gives an excellent impression of the present specimen", but as the ratio of the length of the carapace to the greatest breadth is given as 1 : 1.51 we are again inclined to refer his specimen to *C. nitidus*. Lately Miss Rathbun (1911), in comparing a series of no less than 47 specimens belonging to both species, enumerates 9 points of difference, all of which, save the third (the granulation of the hepatic regions of the carapace is in my material rather finer and more regularly in *C. nitidus*), I can wholly confirm.

In her first diagnosis Miss Rathbun remarks, that *C. inaequalis* is narrower than *C. nitidus*, but this statement must be a slip, for in her paper of 1911 the reverse is expressly stated to be the case. This character at once demonstrates itself on comparing figs. 4 and 5 (pl. 9) and is very obvious, the ratio of length of carapace to breadth being 1 : 1.44 in my larger specimen of *C. nitidus* and 1 : 1.82 in *C. inaequalis*[1]). The antero-lateral margins of the carapace of the first species show five teeth (including the external orbital angle, but not the last strong spine), regularly decreasing in size (see fig. 4*a*) backward, but in de Man's type specimen of

1) In the type specimen of Miss Rathbun the ratio, according to text, becomes 1 : 1.51 (exactly the same as in Laurie's specimen, which is referred to *C. nitidus*), the photograph gives a ratio of 1 : 1.62.

Goniocaphyra truncatifrons it are the posterior teeth that are the larger. The carapace is regularly vaulted, both longitudinally and transversely.

To the 9 points of difference enumerated by Miss RATHBUN it may be allowed to add a tenth, viz. the shape of the external maxillipeds. The latter are rather elongate and slender in *C. nitidus* (fig. 4*b*), the ischium is distinctly longer than broad, as is also the merus, the latter is only slightly produced at its antero-external angle, and on the whole I find an almost complete agreement with DE MAN's figure 1*a*. In *C. inaequalis* on the other hand the external maxillipeds (fig. 5*b*) are much broader, ischium and merus being both broader than long, and the antero-external angle of the latter is greatly produced outward. The horny hairs at the dactylus of the palp are much more finely pectinate in *C. nitidus* than in the other species.

The elongate meropodite of the cheliped bears a proximal and a distal spine in my specimen of *C. nitidus*; in the other species the anterior margin of the meropodite is regularly crenulate. The left (smaller) chela in my ♂ of *C. nitidus* wholly resembles the equal chelae of the ♀ of Miss RATHBUN's species in that the palm is low, rounded and as long as the fingers, but the cutting margin of the immovable finger bears more prominent, triangular teeth in the former species, and is not finely serrulate between these teeth, as in *C. inaequalis* (see fig. 5*c*). The right chela of *C. nitidus* is larger, the palm is longer than the fingers, the latter are high, not gaping, and the cutting margins are provided with a few very broad, but low, teeth.

The present species is recorded from Samoa, Fiji Isles, Noordwachter Island near Batavia, Amboyna, Ceylon, Mauritius, Amirante and Coetivy.

Dimensions in mm.:

Length of carapace	6.75	2.2
Greatest breadth of carapace (just before posterior lateral teeth)	9.75	3.16

MILNE-EDWARDS' very large specimen (breadth of carapace no less than 23 mm.) ranks foremost in size among all other recorded examples.

2. *Catoptrus inaequalis* Rathbun. Pl. 9, Fig. 5.

1906. *Goniocaphyra inaequalis* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, p. 870, textfig. 29, pl. 12, f. 9.
1906. *Catoptrus nitidus* (part) Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 422.
1911. *Catoptrus inaequalis* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239.

Stat. 116. West of Kwandang Bay entrance, north coast of Celebes. Depth 72 m. 1 ♀.

Between this and the preceding species numerous points of difference are already mentioned: the carapace is proportionately broader, the shape of the lateral teeth is different, the middle teeth on either side being the most prominent, the external maxillipeds are much more operculiform. We may add that, as Miss RATHBUN remarks, the infra-orbital margin is entire and not armed with three denticles, as in the preceding species, that the supra-orbital margin passes with a right angle into anterior margin of front (fig. 5*a*), and that the eye-stalks are not thickened at the base and provided with a small knob near the cornea, at the anterior side, as in *C. nitidus* (fig. 4*a*), but simply cylindrical.

This species seems to have an equally wide distribution: it has been first recorded from the Hawaiian Islands and afterwards from several stations near the Seychelles. The "Siboga" record is intermediate between these widely distant localities.

Dimensions in mm.:

Length of carapace	4.85
Breadth of carapace (just before posterior lateral teeth)	8.8

Subfam. Goneplacinae.

This group, which has bestowed its name upon the whole group, is readily characterized by the elongate eye-stalks, and the narrow front. The greatest breadth of the carapace is lying between the tips of the external orbital angles. In some cases the last segment of the sternum is largely exposed, the base of the abdomen of the ♂ by far not reaching to the coxopodites of the posterior legs, but the segment may be in other cases completely covered by the abdomen.

To this subfamily only two genera are referred, *Goneplax* and *Ommatocarcinus*.

Key to the genera:

Eye-stalks moderately elongate; front square-cut, not constricted . **Goneplax** Leach

Eye-stalks very long, thickening towards eye, front constricted between eye-peduncles . . . . . **Ommatocarcinus** White.

Goneplax Leach.

1814. *Goneplax* Leach. Edinburgh Encycl., v. 7, p. 430 (*Goneplat* on p. 393 is an evident typographical error) [1].

1815. *Gonoplax* Leach. Transact. Linn. Soc. London, v. 11, p. 323.

1816. *Gonoplax* Leach. Malacostraca Podophth. Brit., opposite pl. 13.

This genus, on account of its elongate eye-stalks and the narrow front, bears a great resemblance to *Macrophthalmus*, with which it has been generally associated by earlier authors.

The well known European species *G. angulata* (Fabricius) has long been the only representative of the genus. Miers first recorded a species from the Indo-Malayan Archipelago. Lately Miss Rathbun described two new species from the Indo-Pacific and Borradaile [2] has made known an interesting species (*G. hirsutus*) from the South Atlantic, near Rio de Janeiro. The "Siboga" collection yielded two species.

Key to the (Indo-Pacific) species [3]:

1. Lateral margins of carapace slightly converging backward, without teeth, save the strong, spiniform external orbital angle; anterior margin of front somewhat concave. Meropodites of ambulatory

1) Fide Rathbun, Proc. Biol. Soc. Washington, v. 11, 1897, p. 167.

2) British Antarctic ("Terra Nova") Exp., 1910, Zool., v. 3, n° 2, 1916, p. 100, textfig. 11.

3) It must be mentioned here, that Alcock (Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 317) records a small specimen of *Goneplax* from the Persian Gulf, that resembles the European *G. angulata*, but is distinguished by the want of the subterminal spine on the anterior margin of the meropodites of the walking legs.

legs with a subdistal spine at the anterior margin, save in the case of the last legs. . . . . *G. sinuatifrons* Miers

Antero-lateral margins of carapace with an epibranchial tooth, behind external orbital angle 2

2. Lateral margins of carapace feebly convergent backward; external orbital angle spiniform; eye-stalks reniform, greatly widening distally. Meropodites of walking legs with a subdistal spine at anterior margin . . . . . *G. renoculis* Rathbun [1])

Lateral margins of carapace distinctly convergent backward; external orbital angle obtuse or subrectangular; eye-stalks club-like. Meropodites of walking legs unarmed, last pair of legs with the propodites broadened and transformed into swimming paddles . *G. maldivensis* Rathbun

1. *Goneplax sinuatifrons* Miers. Pl. 9, Fig. 2*a*.

1886. *Gonoplax sinuatifrons* Miers. Rep. "Challenger", Brachyura, p. 246, pl. 20, f. 2.

Stat. 181. Amboyna. Depth 36—54 m. 1 ♂, 1 ♀, 8 juv. (aet. div.).

Miers rightly remarked that this species is extremely like the European *G. rhomboide.* (Fabricius), which must be regarded as hardly a subspecies of *G. angulata*, but it differs in having the anterior margin of the front not straight, but slightly concave; it must be said, however, that also in the European species the same character, though less marked, is to be observed. The shape of the carapace is nearly exactly the same, but the slight prominence or tubercle, representing an obsolete epibranchial tooth, in *G. rhomboides* is wholly wanting in the Indian species, and the chelipeds are short and not greatly elongate in the ♂ of the latter species, but this may be perhaps attributed to the small size of the examples as yet found. There is, however, another and perhaps more remarkable feature in the Indian species, viz. the breadth of the abdomen of the ♂, which seems to have been overlooked by Miers, for he expressly states that in all species of *Goneplax* the abdomen entirely covers up the space between the bases of the last legs. Now, in the present species, the first segment is hidden under the carapace, the second segment is exactly one-half, and the third segment not completely two-thirds of the breadth of the last segment of the sternum (fig. 2*a*), so that the lateral parts of the third segment of the abdomen conspicuously fall short of the coxopodites of the legs[2]). In *G. rhomboides*, on the other hand, the first segment is exposed, as broad as the next, both not covering up the last segment of the sternum, the third segment of the abdomen nearly touches the coxopodites of the last legs. In both species the remaining parts of the abdomen are only very slightly narrowed towards the tip, but in *G. sinuatifrons* the terminal segment is shortly-triangular, twice (in the ♀ even 3 times) as broad as long, in *G. rhomboides*, however, more elongate and longer than broad.

1) Proc. U. S. Nat. Mus., v. 48, 1914, p. 145. Hab. Philippines.

2) It may be added, that the same is the case in the ♀, in which the abdomen is only slightly broader than in the ♂; only the first segment is not concealed beneath the carapace.

Chelipeds in the ♂ moderately long, but by far not so much elongate as in the adult ♂ of *G. rhomboides*, in which the meropodite exceeds the length of the carapace. In both species the upper border of the meropodite presents a tooth or an obsolete tubercle, a little beyond the middle of the border, and all three borders are rounded, but in the Indian species the outer border bears a subdistal spine, the inner angle of the wrist is sharply produced, depressed, and there is also a small, but distinct spine on the outer border, which spine is not obsolete in my specimens as in that of MIERS; the chelae are a little unequal, the right being the larger, the palm is low and as long as the fingers, smooth, rounded below and somewhat keeled above; the fingers are closely fitting, greatly compressed, the fixed finger is sharply keeled below, retaining its height at the base for nearly two-thirds of its length, then tapering rapidly towards the very short, scarcely curved-up tip, the movable finger is regularly curved in its distal half, more finely crenulate at its inner margin, at least in the case of the larger chela, than its antagonist, near the base, however, it shows one large, obtuse tooth, directed backward, which tooth is absent in the left chela.

The ambulatory legs are slender; as in *G. rhomboides*; the meropodites, save those of the last pair, exhibit a subdistal spine at the anterior margin, and all are considerably narrowed distally; the dactyli are conical, very thin and finely pointed.

The whole animal, which is of an ivory-white colour, is almost perfectly hairless, only the walking legs bear some few short, widely-scattered hairs, even on the dactyli. In *G. rhomboides* the dactyli, which are flattened like those of *Ocypoda*, are fringed with dense, short hairs, especially in the case of the first and second pair.

MIERS regarded his unique specimen as probably not being fully adult, on account of its small size (length of carapace little more than 7 mm., breadth about 9.5 mm.). None of the 10 "Siboga" specimens even attains this size and it may well be possible, that indeed the species does not grow larger.

Dimensions in mm :

	♂	♀
Greatest breadth of carapace (distance between external orbital angles) .	8.4	9.25
Length of carapace	5.3	6.5
Breadth of front at anterior margin.	2.2	2.3

The "Siboga" examples were got at exactly the same locality, whence the "Challenger" obtained the hitherto only specimen.

2. *Goneplax maldivensis* Rathbun. Pl. 9, Fig. 1.

1902. *Goneplax maldivensis* Rathbun. Bull. Mus. comp. Zool. Harvard Coll., v. 39, p. 124, figs. 3—5.

Stat. 204. Between Wowoni and Buton Island, south-east of Celebes. Depth 75—94 m. 2 ♂ juv.

The carapace of this minute species is almost straight transversely and longitudinally, but curved in its anterior part towards the front, which latter is perpendicularly deflexed; the surface is smooth, finely punctate anteriorly (I did not observe the "finer wrinkles" mentioned by Miss RATHBUN); there are faint traces of two epigastric lobes; the gastric region as a whole

is obscurely indicated, with an indistinct longitudinal sulcus between the protogastric areas, a cervical groove is present, but very short and straight, and a cardiac area is separated from the branchial regions, but on the whole the carapace may be regarded as nearly not subdivided into regions.

The ratio of the length of the carapace to its greatest breadth (the latter being taken between the tips of the epibranchial teeth) is 1 : 1.46 in my larger specimen, in that of Miss RATHBUN it is 1 : 1.53 according to text and 1.61 in the figure, accordingly in the "Siboga" specimen the carapace is proportionately narrower, but perhaps this may be attributed to the small size of my specimen.

The front is broader than either orbit, its surface is obscurely grooved in the middle, and its anterior margin is perfectly straight [1]). Eye-stalks short, increasing in thickness towards the eye, which is greatly enlarged and club-like in anterior view. Supra-orbital margin entire, sloping backward towards the subrectangular, not at all prominent, external orbital angle; behind this angle a single, sharp epibranchial tooth is found, curved forward and somewhat outward; it is between the tips of these teeth that the carapace attains its greatest breadth. Behind these epibranchial teeth the margins of the carapace are distinctly convergent backward, so that the posterior breadth, at the level of the penultimate pair of legs is about three-fourths of the distance between the external orbital angles.

Peduncle of the antennae free, flagella little longer than width of orbit. Lateral margins of buccal cavern convergent backward; external maxillipeds slender (fig. 1*a*), with the merus rectangularly rounded at the antero-external angle and very slightly prominent outward; inner margins of both ischium and merus crenulate and hairy.

The chelipeds are short, finely granulate and equal in my specimen, but unequal according to Miss RATHBUN. Meropodite short, with sharp borders, outer border crenulate, inner margin unarmed, upper border with a row of long hairs, extending to the subterminal, acuminate and curved spine (not a blunt tooth as Miss RATHBUN observed) near the distal end. Wrist small, with sharply-produced and flattened inner angle, but devoid of the outer spine of *G. sinuatifrons*. Chela (fig. 1*b*) not elongate, palm longer than fingers, with the borders rounded, upper margin of chela with a row of hairs; fingers greatly compressed, immovable finger not sharply keeled below, straight, with the tip curved upward, cutting margin with about 5 crenulations, the 2nd and 3rd of which are much broader than the remaining ones, movable finger greatly curved towards the tip, inner margin crenulate, but near the base a large, obtuse tooth is seen; outer surface of chela granulate, the granules tending to form two longitudinal rows on each finger. Miss RATHBUN's figure of the right chela differs rather much from mine; the palm appears to be much more inflated, and the fingers are shorter, apparently not compressed; the crenulations on the inner margins of the fingers are not clearly shown.

The walking legs are slender, but not very long, the penultimate pair being not yet twice as long as the carapace. Meropodites five times as long as broad, quite unarmed distally; dactyli finely pointed, not flattened, considerably longer than the preceding propodites. The legs are somewhat more hairy than in *G. sinuatifrons*, but these hairs are rather widely

1) In my specimen I neither noticed the lateral notches in which the peduncles of the antennae are lodged, nor the impressed line near and parallel to the margin of the front, as noted by Miss RATHBUN.

scattered, even on the dactyli. The last pair of legs is peculiarly transformed: the carpo- and especially the propodite are rather much flattened, so as to form a swimming paddle; the latter joint is indeed broader than half the length of the anterior margin (RATHBUN); the dactylus is perfectly straight, not curved near the tip, flattened, but not considerably broadened. All three named joints are fringed with feathered hairs (fig. 1*c*), generally as long as the breadth of the joint to which they are attached, but longer on the inner margin of the propodite, and on the inner margin of the dactylus decreasing in length from base to tip; the outer margin of the dactylus bears numerous feathered hairs of about equal length, between which are placed a few ordinary hairs.

The abdomen of my larger ♂ specimen (fig. 1*d*) differs somewhat from that figured by Miss RATHBUN in being considerably broader from the 4th segment to the tip; in other points there is a general agreement: the 1st segment is hidden under the carapace (in my figure it is exposed, on account of the abdomen being severed from the cephalothorax), the 2nd segment is as broad as the following and both entirely cover the last segment of the sternum. As has been said the rest of the abdomen of Miss RATHBUN's specimen is very narrow, the last segment being much longer than broad, whereas in my specimen the abdomen resembles that of *G. sinuatifrons* in being considerably wider, the terminal segment presenting about equal dimensions in length and along the base.

Notwithstanding small discrepancies between the descriptions there can be no doubt as to the identity of my specimen with Miss RATHBUN's, the differences being easily accounted for either by the different size of the examples or to individual variations. The shape of the carapace with its rectangular, not prominent external orbital angle, followed by an acuminate epibranchial tooth, and the transformation of the last pair of legs into swimming paddles afford excellent specific characters.

Miss RATHBUN's specimen was caught at Gan Island, Addu Atoll, Maldive Arch.

For completeness' sake I add the measurements of this former example.

Dimensions in mm.:		1 ♂	2 ♂
Distance between external orbital angles		4.3	7.5
Breadth of front		1.65	2.5
Distance between tips of epibranchial teeth		4.5	7.8
Length of carapace		3.1	5.1
Length of meropodite	of penultimate pair of legs	2.2	—
Breadth of meropodite	of penultimate pair of legs	0.44	—
Length of carpo-and propodite together	of penultimate pair of legs	1.85	—
Length of dactylus	of penultimate pair of legs	1.4	—
Length of meropodite	of last pair of legs	1.65	—
Breadth of meropodite.	of last pair of legs	0.44	—
Length of carpo-and propodite together	of last pair of legs	1.75	—
Length of propodite along anterior margin	of last pair of legs	0.71	—
Breadth of propodite	of last pair of legs	0.39	—
Length of dactylus	of last pair of legs	1.1	—

N° 1 is the "Siboga" specimen, n° 2 that of Miss RATHBUN.

Ommatocarcinus White.

1852. *Ommatocarcinus* White. Append. in Stanley's Voy. H. M. S. "Rattlesnake", v. 2, p. 393.

There can be no doubt, as has been suggested by MIERS, that this genus is nearly related to *Goneplax*, which it resembles in the great elongation of the eye-stalks and the chelipeds, the bulging of the corneae, the narrowness of the front and the fine build of the dactyli of the walking legs.

From *Goneplax* the present genus is distinguished by the greatly-developed, spiniform external orbital angle being directed straightly outward, by the much concave lateral margins, and consequently the acuminate angles, of the front, and by the shortness of the antennae.

Two species have been described from Australian and New Zealandian waters, viz.: *O. macgillivrayi* White [1]) and *O. huttoni* Filhol [2]). I shall not venture to give a diagnostic key to these species (which are both incompletely known), because I had no opportunity of consulting the original description and figure of WHITE. It is most remarkable, that apparently a new species of the genus has been found by the "Siboga" in the Indo-Malayan Archipelago.

1. *Ommatocarcinus orientalis* n. sp. Pl. 10, Fig. 2.

Stat. 260. 5° 36'.5 S., 132° 55'.2 E. North-west of Kei Islands. Depth 90 m. 1 ♂.

This remarkable species is somewhat vaulted in transverse direction, more so in a longitudinal sense; regions are very faintly indicated on the carapace, but there is a trace of two epigastric lobes, a longitudinal, broad and shallow depression behind them on the gastric region, and branchial and hepatic regions are separated by a concave groove on either side, much curving backward on the median side, but not connected by a cervical groove, that is entirely absent. The whole surface is perfectly smooth, without any granules or hairs.

The front is obliquely deflexed, somewhat constricted between the eye-stalks (fig. 2*b*); measured in dorsal view it is little less than one-fourth the greatest width of the carapace, the anterior margin is somewhat concave, with an obtuse prominence in the middle, and the lateral angles are acuminate, not rectangular. The supra-orbital margins are greatly sloping backward, so that a line connecting the external orbital angles divides the median longitudinal axis of the carapace into two nearly equal parts; (in *O. huttoni*, and probably also in WHITE's species, the supra-orbital margins are nearly transverse), in the middle third of their course they are bulging forward, becoming again concave towards the spiniform external orbital angles, which are large, directed straightly outward, like in the other species, not flattened; the distance between the tips of these teeth is only slightly less than twice the length of the carapace. The lateral margins of the latter are unarmed, straight, greatly converging backward, so that the breadth of the carapace at the level of the penultimate pair of legs measures not yet two-thirds of its greatest breadth, the posterior margin is perfectly straight.

1) L. c., p. 393, pl. 5, f. 1; *O. macgilliveri* H. Milne-Edwards, Ann. Sc. Nat. (3), t. 18, 1852, p. 163; *O. macgillivrayi* Miers, Rep. "Challenger", Brachyura, 1886, p. 247. Hab. Port Curtis (Australia) and Queen Charlotte Sound near Long Island (New Zealand).

2) Miss. île Campbell, t. 3, prt 2, 1885, p. 384, pl. 43, f. 1—2, 5. Hab. Otago (New Zealand).

The orbits are long, narrow trenches, for the reception of the eye-peduncles; the inferior margin (fig. 2*a*), which, like the opposite one, is wavy, presents a broad, triangular, but low tooth in its inner part, tipped by a feathered hair; similar hairs, three in number, are placed on the convex part of the margin. Both margins are very finely crenulate, the inferior one does not project beyond the superior, in dorsal view, and on the dorsal roof of the orbit is placed a serial row of ordinary hairs, increasing in length towards the outer tooth. The eye-stalks are very much elongate, the basal joint is not very thick, but the second greatly enlarges gradually towards the much bulging cornea, which in dorsal view occupies one-third of the whole length of the eye-stalk; the length of the latter exceeds the breadth of the orbit, so that the stalk, if laid back into the orbit, slightly projects with the terminal part of the cornea beyond the outer orbital angle.

The antennulae are folded quite transversely beneath the anterior margin of the front; they are much longer and thicker than the small antennae, the peduncle of which rises freely at the inner side of the base of the inner suborbital lobe, in the wide gap between this lobe and the lateral angle of the front; the flagellum of the antennae consists of about seven joints, which together are scarcely as long as one-third of the length of the eye-peduncle. Epistome distinct, somewhat produced at its free margin, nearly vertical. Margins of buccal cavity convergent backward. External maxillipeds (fig. 2*c*) greatly divergent forward, ischium longer than broad and longer than the small, quadrate merus, the antero-external angle of which is not produced and rounded off (according to FILHOL's figure 5 this angle is greatly obtuse); exognath half as broad as ischium; inner margin of ischium and merus crenulate and hairy.

The chelipeds are greatly elongate, as seems to be the usual case in the genus, at least in the ♂, measuring more than 3 times the length of the carapace; in my specimen they are equal in length and size (in *O. huttoni* the right cheliped of the ♀, the only sex known, is slightly the larger). Meropodite (fig. 2*d*) long-stretched, nearly cylindrical in section, but inner margin with a thin, sharp keel, that is abruptly cut off near the distal articulation and regularly crenulate and somewhat hairy for the greater part of its length, upper border wholly unarmed (both in *O. macgillivrayi* and *O. huttoni* it is armed with a spinule in the middle, and in the ♀ of the first species there are 2—3 spinules on the distal part of the anterior border, according to MIERS). Wrist very small; in dorsal view of the cheliped the inner angle is very inconspicuous, but if the cheliped be outstretched and examined in outer view (fig. 2*d*) this inner angle turns out to be large, triangular, and directed upward. Chela elongate, palm twice as long as high, gradually increasing in height towards base of movable finger, borders rounded; near upper border the palm is very minutely granulate, but not hairy; the outer surface, like that of the whole cheliped, bears some few low granules or meandrian wrinkles; the fingers are greatly shorter than the palm, depressed, but not keeled; the fixed finger is straight, in a line with the under border of the palm, slightly curved up at the tip, and regularly crenulate at inner margin; the movable finger is rather high, curved in its distal half, inner margin with a few indistinct crenulations, the basal one of which, in the right chela, is much the largest.

Ambulatory legs slender, but not very long, shorter and weaker than the chelipeds, but more slender than in *O. huttoni*, according to FILHOL's figure; they are wholly hairless, even

on the propodites and the dactyli, except for some minute hairs on the meropodites. These latter are five times as long as broad, narrowing towards the distal end, unarmed, longer than carpo- and propodite together; dactyli long, curved, styliform, finely pointed, as long as propodites.

Abdomen of ♂ (fig. 2*e*) much resembling that of *G. sinuatifrons* (pl. 9, fig. 2*a*): first segment hidden under the carapace; second segment exposed, half as broad only as the last segment of the sternum, so that a wide space is left between the sternum and the last pair of legs; third segment but very little broader than the preceding, with the lateral angles obtuse, scarcely prominent; fourth to sixth segment gradually increasing in length, fourth and fifth segment narrowing forward, though very little, sixth segment with lateral margins perfectly parallel and twice as broad as long; terminal segment triangular, somewhat longer than the preceding, but little more than half as long as broad, tip rectangular. That the base of the abdomen is much narrower than the space between the insertion of the posterior legs is also shown in FILHOL's figure of *O. huttoni*.

The occurrence of this new representative of *Ommatocarcinus*, which in its outer appearance recalls some broad-fronted species of *Uca*, (on account of the greatly-elongate eye-stalks), in the Indo-Malayan region is worth mentioning, the genus being hitherto confined to East Australian and New Zealandian waters only. The single specimen is very small, measuring not yet 5 mm. in breadth, the other two species grow to a much larger size; as has been said, I could not consult WHITE's original diagnosis and so I am ignorant, whether dimensions at all are given, but MIERS' specimens (both ♀) of *O. macgillivrayi* are very much larger, the breadth of the carapace, not including outer orbital angles, measuring 15 and 19 mm., and the single specimen of *O. huttoni* even attains a maximum breadth of 33 mm., with the lateral spines included.

Dimensions in mm.:

Greatest breadth of carapace (lateral teeth included)	4.6
Breadth of front between bases of eye-peduncles	1.1
Length of eye-peduncle	2.25
Transverse diameter of eye	0.6
Length of carapace	2.35
Length of cheliped	7.5

Subfam. PRIONOPLACINAE.

This subfamily was originally instituted by STIMPSON [1]) to receive his genus *Euryplax*, described already in 1862, and some related genera; the name *Euryplacinae* was accordingly bestowed upon the group. MIERS [2]) retained it as a subgroup of his subfamily *Carcinoplacinae* (fam. Ocypodidae) and afterwards ALCOCK [3]), becoming aware that most likely the obscure genus *Prionoplax* of H. MILNE-EDWARDS, established as early as 1852, would form the prototype of the group, accordingly altered the name of this subfamily into *Prionoplacinae*.

1) Bull. Mus. comp. Zool. Harvard Coll., v. 2, 1870, p. 150.
2) Rep. "Challenger", Brachyura, 1886, p. 222. Into the same group the *Eucratopsinae* of STIMPSON (l. c., p. 151) are included.
3) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 286, 292.

Without ample material, such as only Miss RATHBUN may dispose of, it is impossible to discriminate the genera and species of the group. Nearly all genera are very obscurely known, most of the species are not figured at all.

The *Prionoplacinae*, like the *Pseudorhombilinae*, but apparently even at a higher degree, are nearly related to Xanthid genera, such as *Panopeus* and *Galene*. The characteristic diagnostic feature of the group, which I am, for want of material, unable to appreciate fully, consists in the abdomen of the ♂ being narrow, the third segment, and *à plus forte raison* the second, distinctly falling short of the breadth between the bases of the posterior legs, and narrower than the first segment.

The following is an account of the genera of the present group in chronological order:

Prionoplax H. Milne-Edwards, Ann. Sc. Nat. (3), t. 18, 1852, p. 163. Species: *P. spinicarpus* (See Arch. Mus. Paris, t. 7, 1853, p. 167, pl. 11, f. 3). Hab. unknown. A second species is *P. ciliata* Smith (Transact. Connecticut Ac., v. 2, 1870, p. 160) from Panama.

Speocarcinus Stimpson, Ann. Lyc. Nat. Hist. New York, v. 7, 1862, p. 59. Species: *S. carolinensis* (l. c., p. 59, pl. 1, f. 1—3; RATHBUN, Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 281; Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11, textfig. 2). Several additional species have afterwards been added: *S. granulimanus* Rathbun, Proc. U. S. Nat. Mus., v. 16, 1893, p. 242, *S. californiensis* Rathbun, Harriman Alaska Exp., v. 10, 1903, p. 190, pl. 9, f. 1, *S. ostrearicola* Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 545, p. 48, f. 2. The type species is West Indian, the two next species are from California, and *S. ostrearicola* comes from Peru.

Euryplax Stimpson, Ann. Lyc. Nat. Hist. New York, v. 7, 1862, p. 60. Species: *E. nitida*. Literature and description: RATHBUN, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 8. Hab. West India. Second species: *E. polita* Smith (Transact. Connecticut Ac., v. 2, 1870, p. 163) from Panama.

Eucratopsis Smith, Amer. Journ. Sc., v. 48, 1869, p. 391; Transact. Connecticut Ac., v. 2, 1870, p. 35. Species: *Eucrate crassimanus* Dana, which, according to STIMPSON's researches (Journ. Nat. Hist. Boston, v. 7, 1863, p. 588) is generically distinct from DE HAAN's species *Eucrate crenata*. Afterwards *Eucratoplax elata* A. Milne-Edwards (Bull. Mus. comp. Zool. Harvard Coll., v. 8, 1880, p. 18) has been added to *Eucratopsis* by Miss RATHBUN (Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 281). Hab. West India and Rio de Janeiro (?)

Glyptoplax Smith, Transact. Connecticut Ac., v. 2, 1870, p. 164. Species: *G. pugnax* from Panama. Probably this genus is more nearly related to *Panopeus* and so to the Xanthidae.

Panoplax Stimpson, Bull. Mus. comp. Zool. Harvard Coll., v. 2, 1871, p. 151. Species: *P. depressa* from West India. See also: RATHBUN, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 12.

Eucratoplax A. Milne-Edwards, Bull. Mus. comp. Zool. Harvard Coll., v. 8, 1880, p. 17. Species: *E. guttata* from West India. A second species of MILNE-EDWARDS (*E. elata*) seems to belong to *Eucratopsis*.

Oediplax Rathbun, Proc. U. S. Nat. Mus., v. 16, 1893, p. 241. Species: *O. granulata* from the Gulf of California.

Tetraplax Rathbun, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 9. Species: "*Frevillea*" *quadridentata* Rathbun, Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 287, pl. 8, f. 1. Hab. West India.

Cyrtoplax Rathbun, Proc. U. S. Nat. Mus., v. 47, 1914, p. 118, pl. 2. Species: "*Eucratoplax*" *spinidentata* Benedict, John Hopkins Un. Circ., v. 11, n° 97, 1892, p. 77; Rathbun, Ann. Inst. Jamaica, v. 1, 1897, p. 26; "*Eucratopsis*" *spin.* Rathbun, Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 281; Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11. Hab. West India.

Chasmophora Rathbun, Proc. U. S. Nat. Mus., v. 47, 1914, p. 119. Species: "*Eucratopsis*" *macrophthalma* Rathbun, Proc. U. S. Nat. Mus., v. 21, 1898, p. 601, pl. 43, f. 3—4, from Panama.

Homoioplax Rathbun, Proc. U. S. Nat. Mus., v. 48, 1915, p. 146. Species: "*Pseudorhombila*" *vestita* var. *sexdentata* (Haswell) Miers, Zool. H. M. S. "Alert", 1884, p. 240, pl. 24, f. B. Hab. Indo-Malayan Arch.

A primary division between the genera, though based on the ♂ only, has been proposed by Miers [1]: one, in which the last segment of the sternum is for the greater part concealed, the anterior corners being only visible, and another, in which this last segment is largely exposed. To the first group the following genera would belong: *Euryplax*, *Eucratopsis*, *Panoplax*, *Oediplax* and *Homoioplax*, to the second: *Speocarcinus*, *Eucratoplax*, *Prionoplax*, *Cyrtoplax* and *Chasmophora*. *Glyptoplax* is left aside on account of its doubtful affinities to the *Prionoplacinae*, and I am uncertain as to the exact place of *Tetraplax*, as the original description of "*Frevillea*" *quadridentata* is inaccessible to me; in Miss Rathbun's paper of 1901 the abdomen is said to be narrower than the sternum and most likely it would therefore belong to the second group.

As results from the list given here nearly all the genera are American, the species living either at the Atlantic or the Pacific coasts, in shallow water. *Homoioplax* forms the only exception. The "Siboga" not only dredged the only species of the latter genus, but also two other species of the *Prionoplacinae*, one belonging to *Speocarcinus*, and another constituting apparently a new genus.

1. *Homoioplax haswelli* (Miers) Rathbun. Pl. 10, Fig. 1.

1884. *Pseudorhombila vestita* (de Haan) var. *sexdentata* (Haswell) Miers. Zool. H. M. S. "Alert", p. 240, pl. 24, f. B.
1886. *Pilumnoplax vestita* var. *sexdentata* (Haswell) Miers. Rep. "Challenger", Brachyura, p. 229.
1915. *Homoioplax haswelli* Rathbun. Proc. U. S. Nat. Mus., v. 48, p. 146.

Stat. 2. Madura Strait, south of Madura. Depth 56 m. 1 ♂.

Miers supposed that this species was nearly related to "*Curtonotus*" *vestitus* de Haan,

1) Rep. "Challenger", Brachyura, 1886, p. 222.

which now is agreed to have its proper place in *Pilumnoplax*, and identified it, though with much reserve, with "*Eucrate*" *sexdentatus* Haswell [1]). In reality the present species has nothing to do with that of DE HAAN, and, as to "*Eucrate*" *sexdentatus* Haswell, it is so insufficiently known as to be better discarded altogether. MIERS himself proposed the specific name *haswelli* for his specimen, for the case the latter would turn out to be distinct. Lately Miss RATHBUN, becoming aware of MIERS' description of the abdomen, definitely removed the species from the *Pseudorhombilinae*, creating a new genus, *Homoioplax*, for it among the present subfamily.

Carapace and legs are "scantily pubescent", according to MIERS; in my specimen only a few short hairs are observed on the carapace; much more conspicuous, however, is a coarse granulation al over the carapace and over the exposed part of the sternum. The former is moderately vaulted in both main directions, strongly declivous on the lateral branchial regions, the whole surface is sculptured, a cervical groove, though discontinued, is found before the middle of the longitudinal axis of the body, and before this groove a very broad gastric area is found, which is generally not subdivided, but anteriorly two epigastric ridges are seen, separated by a narrow groove, which, immediately behind the ridges, bifurcates and disappears gradually. Between hepatic and branchial regions the carapace is bulging; a cardiac area is separated off from the inner branchial ones, the latter are defined laterally by a conspicuous, broad groove, beyond which the carapace is sloping abruptly downward.

The front measures, between the bases of the eye-peduncles, nearly exactly one-half of the distance between the outer orbital angles; it is nearly horizontal, scarcely deflexed, granulate like the rest of the carapace, with an obscure longitudinal groove in the middle; the anterior margin is perfectly straight, with a very slight notch in the middle, and is distinctly visible in dorsal view; the lateral margins are divergent backward and thickened and pass insensibly into the concave, almost transverse, superior orbital margins, the external angle of which is acute, somewhat depressed, and not much prominent. The distance between these angles is exactly the same as the length of the carapace. Parting from the external angles the lateral margins of the carapace are divergent in their anterior third portion, finely serrate and armed with two prominent and sharp epibranchial teeth. The anterior of these teeth is placed nearer to the external orbital angle than to the posterior tooth, it is flattened, and of the same shape as the orbital angle, though conspicuously larger; the posterior tooth is not flattened, but spiniform, slightly curved, directed obliquely-forward, and between the tips of these teeth the greatest width of the carapace is to be found. Behind the posterior teeth the lateral margin is not sharply marked off as a prominent ridge, but entirely disappears; in dorsal view of the carapace, however, it describes a sigmoid curve, being first concave and then convex, mainly parallel to that of the other side; the posterior margin is slightly concave in the middle.

The eye-peduncles are very short and thick; the retina of the eye is of a light horny colour, not black (in spirit preservation); the finely-serrate and quite straight inferior orbital margin reaches farther forward at the inner end, where it is cut abruptly, so that a wide space is formed, between this inner orbital angle and the lateral angle of the front, for the reception

1) Cat. Austral. Crust., 1882, p. 86.

of the antenna, the flagellum of which consists of 15 joints, and reaches outward as far as to the tip of the anterior epibranchial tooth. The antennulae are folded quite transversely beneath the front, separated by a narrow septum. Epistome short, but distinct, transversely deeply folded. Lateral margins of buccal cavity conspicuously convergent backward; external maxillipeds consequently greatly divergent forward, slender, ischium twice as long as broad, longitudinally sulcate, merus quadrate, with the antero-external angle rectangular, not prominent, exognath slender, not quite half as wide as ischium.

Chelipeds subequal, of moderate length, granulate at outer surface. Meropodite projecting somewhat beyond carapace, borders sharpened, but unarmed, except for a triangular, curved tooth near the distal end of the upper margin, which tooth is preceded by a row of long hairs, extending also along the outer border; carpopodite with a large, flattened tooth as the inner angle, beneath which a tuft of hairs projects, which is continued at either end into a row of shorter hairs; chela (fig. 1 *a*) not much elongate, though more than twice as long as high; palm $1^1/_2$ times as long as the fingers, finely granulate at both surfaces, with upper and under border rounded, the latter nearly in a straight line with that of the fixed finger; fingers compressed, but not keeled; under finger with a row of short, feathered hairs beneath, continued towards one side to the curved, blunt tip and proximally extending to the palm, cutting margin with a few coarse teeth; movable finger curved, granulate on the back, where a row of feathered hairs, diminishing in length distally, is observed to extend to the tip, proximally these hairs extend to the upper border of the palm, inner margin with some low teeth, interlocking with those of the other finger, one tooth, near the base, being most prominent, blunt and directed backward, at least in the right chela.

Ambulatory legs slender, elongate, the penultimate pair measuring about $2^1/_2$ times the length of the carapace. Meropodites $6^1/_2$ times as long as broad, narrowing distally, unarmed, but fringed with a few hairs, which on the anterior margin are feathered; anterior margin of carpopodite and both margins of propodite fringed with long hairs, which are especially long in the case of the posterior legs, in which the propodites are comparatively shorter and more flattened (without, however, assuming the shape of swimming paddles) than in the preceding pairs. Dactyli longer than propodites, not flattened, almost completely straight, though slightly curved at the tip, with four longitudinal rows of hairs, the two marginal rows being the longest; in the last pair of legs the dactyli are perfectly straight, somewhat flattened, with only an inner and an outer series of long hairs, which are feathered, like those of the propodites (fig. 1 *b*).

The abdomen of the ♂, like the sternum, is granulate; it is rather thick, not transparent, as perhaps we should expect in so small an animal. The first segment (fig. 1 *c*) entirely covers the sternum between the last pair of legs; the second segment rapidly narrows distally, so that the last segment of the sternum is visible at either side of this abdominal segment; the third segment again widens laterally, but does not quite reach the bases of the last legs.

Though, to my mind, there cannot be any doubt about the identity of the "Siboga" specimen with those of the "Alert" expedition, described by MIERS, there are a few points put forth by this author, which I cannot confirm. According to MIERS, the chelae are pubescent,

and it is this feature which induced him to regard his specimens as closely related to "*Carcinoplax*" *vestita* (de Haan), whereas I observed only a row of feathered hairs along upper and under border and none on the surface of the chela; in the "Challenger" specimens of Miers the chelae are said to be pubescent on the upper part of the palm and the base of the dactylus, and the carpopodite presents an obsolete tooth on the outer margin. Apart from the quite different shape of the abdomen in the present species and in that of de Haan, the shape of the carapace in the former, with its prominent antero-lateral teeth, its roughly-quadrangular outline and its marked sculpture certainly affords evidence of the distinctness of these two species; besides "*Carcinoplax*" *vestita* grows to a much larger size.

Whether Miers' species is identical with "*Eucrate*" *sexdentata* Haswell must remain uncertain, on account of Haswell's quite incomplete diagnosis.

The "Alert" specimens were obtained in the Arafura Sea, from a depth of 32—36 fathoms, those of the "Challenger" in the Japanese Seas, from 10—15 fathoms. These examples were only slightly larger than that of the "Siboga" expedition.

Dimensions in mm.:

Distance between external orbital angles		5.2
Breadth of front between eye-stalks		2.5
Greatest breadth of carapace (between tips of posterior lateral teeth)		7.—
Length of carapace		5.2
Length of meropodite	of penultimate pair of legs	5.—
Breadth of meropodite		0.75
Length of carpopodite along anterior margin		2.—
Length of propodite along anterior margin		2.5
Breadth of propodite		0.5
Length of dactylus		1.15

Speocarcinus Stimpson.

1862. *Speocarcinus* Stimpson. Ann. Lyc. Nat. Hist. New York, v. 7, p. 59.

This genus now contains four species, enumerated on p. 189, which in their outer aspect much resemble *Rhizopinae*, on account of their vaulted carapace, the small eyes, partly concealed in upper view, and long, hairy legs. In the *Rhizopinae,* however, the surface of the carapace is scarcely or not at all sculptured and the lateral margins, if at all, are obscurely notched, never toothed; the eye-peduncles, which are very short, are usually fixed, not mobile and nearly completely concealed in dorsal view of the animal, and the abdomen of the ♂ is very narrow at its base, covering one-half or one-third only of the space between the last pair of legs, whereas in *Speocarcinus* the carapace is sculptured and toothed, the eye-stalks are mobile, and the abdomen of the ♂ occupies the greater part of the last segment of the sternum.

Miss Rathbun, who examined all the species and herself made known three of them, has never provided a key to discriminate them. As to myself, I am unable to do so, partly because the description of one species (*S. californiensis*) is inaccessible to me, and partly on account of the general deficiency of the diagnoses. I can only say that in *S. granulimanus*, from Lower California, the outer orbital angle is followed by three antero-lateral teeth, separated

by narrow sinuses and not prominent, that the supra-orbital margin has two notches and that the chelae are provided with longitudinal rows of granules, whereas in *S. carolinensis*, from West-India, and *S. ostreariсola*, from Peru, the antero-lateral teeth are more prominent (five in the former, the anterior one being fused with the external orbital angle, and three broad, flattened ones in the latter species), the supra-orbital margins are not notched, at least according to figures, and the chelae are quite smooth.

All four species are American; the type species (*S. carolinensis*) is known to inhabit subterranean galleries, excavated in the mud of shallow water, probably by other animals. It is this habit that gave rise to the generic name.

Among the Brachyura of the "Siboga" I found one animal, which, on account of its striking resemblance to the type species, is considered to be a new species of *Speocarcinus*.

1. *Speocarcinus celebensis* n. sp. Pl. 11, Fig. 1.

Stat. 116. West of Kwandang Bay entrance, north coast of Celebes. Depth 72 m. 1 ♂.

This small specimen exhibits most of the distinctive characters of the genus and consequently I have referred it to *Speocarcinus*, though the third segment of the abdomen is scarcely produced laterally and the fourth to sixth segments are not coalesced.

The ratio of the length of the carapace to its greatest width is 1 : 1.4 [1]), its surface is much convex in longitudinal direction, but nearly straight transversely. Regions are fairly well to be made out: the mesogastric area is distinctly outlined, the protogastric lobes are defined anteriorly by two epigastric ridges, between which a deep furrow divides the surface of the front; a sulcus separates the hepatic region from the protogastric and branchial areas, which themselves shade into one another; a cardiac area is also seen behind the cervical groove. The surface of the carapace is somewhat granulate towards the margins, which are fringed with hairs; these hairs are also seen on the subhepatic and subbranchial regions.

The front is vertically deflexed, its width is more than one-half (exactly 56 %) of the distance between the external orbital angles, or rather of the fronto-orbital breadth; in dorsal, and also in ventral view, it is inflated, made up of two equal, rounded lobes, separated by a deep furrow, but in anterior view the free margin is regularly convex; the lateral angles are not produced. The orbits are small, marginal, the supra-orbital margin forming scarcely a distinct excavation in the regular outline of the carapace, which excavation is completely filled by the short eye-stalks, terminating in a very small eye, chiefly situated ventrally. The supra-orbital margin is entire, not notched, transverse, passing with a gentle curve into the lateral margin of the carapace, so that an external orbital angle is not formed. The antero-lateral margin of each side, however, presents three epibranchial teeth, the first of which is the larger, well defined by deep sinuses both anteriorly and posteriorly, somewhat flattened, but ending in a short spine, directed forward; the second and third teeth, at the level of which the carapace

1) In *S. carolinensis*, to which this species shows the greatest affinity, the ratio is 1 : 1.3 in Porto Rican specimens and in one from Tortugas; in a specimen from Charleston (South Carolina) the ratio is less and intermediate between the Porto Rican specimens and the type specimen, which latter presents the narrowest carapace (RATHBUN Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11).

reaches its greatest width, are spiniform, the former larger than the latter, both directed forward. Behind the teeth the margins of the carapace remain parallel and the posterior one is very long and convex.

Antennulae short, folded transversely in their fossae beneath the front. Antennae free in the inner orbital gap, reaching laterally to the tip of the first antero-lateral tooth. Epistome short, but distinct, its distal border wavy. Lateral margins of buccal cavity convergent backward, as also the longitudinal axes of the external maxillipeds, which consequently leave a wide triangular space between them; ischium (fig. 1*a*) slightly longer than broad, and longer than the merus, which is broader than long, owing to the antero-external angle being conspicuously produced outward; exognath about half as broad as ischium.

Chelipeds (the right only is present in my specimen) much shorter than the legs, granulate at outer and upper surface, and hairy, especially on the chela. Meropodite short, inner and outer border somewhat serrate, upper border with a subterminal tooth; wrist with a flattened, not much prominent tooth at inner angle, which is directed forward; chela (fig. 1*b*) small, palm as long as high and as long as the fingers, borders, especially the upper one, with a row of hairs, which extend on to the fingers, outer surface granulate, the granules being arranged in four groups, stretching longitudinally, the upper and under group of which likewise are continued on the back of the fingers, fingers somewhat compressed, not gaping, irregularly-crenulate at opposite margins, sharply acuminate at the curved tip.

Ambulatory legs long and slender, the penultimate pair being three times as long as the carapace, the four last joints fringed with rather distant hairs, more closely set on the dactyli. Meropodites six times as long as broad, unarmed, carpo- and propodites elongate, dactyli as long as, or slightly shorter than, propodites, faintly curved near the tip; in the last pair of legs the propodites are shortened and the dactyli are almost straight and somewhat more flattened than in the preceding pairs.

The first segment of the abdomen of the ♂ (fig. 1*c*) is partly hidden under the carapace and occupies three-fourths of the space between the last pair of legs, the second segment is only half as broad as the preceding, and the third about as broad as the second and scarcely produced laterally, the remaining segments are all distinct, not coalesced, gradually decreasing in breadth. This shape of the abdomen differs widely from those of other species (at least *S. carolinensis* and *S. granulimanus*) in the third segment being not or scarcely produced laterally and in the third to fifth segment not being fused; it is, on the contrary, much more *Rhizopine*-like. As has been already stated, however, the whole aspect of the "Siboga" specimen so strongly suggests a close affinity to *S. carolinensis*, in the sculpture and dentation of the carapace, that a removal of my specimen from the present genus does not appear to be justified. From *S. carolinensis* the new species is distinguished by the carapace being comparatively broader [1]), by the front measuring more than half the fronto-orbital breadth, by the absence of a distinct outer orbital angle, by a less curved course of the lateral margins of

1) In comparing Miss RATHBUN's figure (Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11, textfig. 2) with my own the reverse seems to be the case, but there are individual variations in the West Indian species in the ratio of length and greatest width of carapace.

the carapace (in *S. carolinensis* the distance between the posterior teeth is greater than that between the preceding) and by the chelae being granulate, not smooth.

Notwithstanding the differently-shaped abdomen, the "Siboga" specimen truly belongs to *Speocarcinus*, and this is the first instance of a representative of the genus outside the American waters.

Dimensions in mm.:

Fronto-orbital breadth.	2.75
Breadth of front.	1.55
Greatest breadth of carapace . . .	3.85
Length of carapace.	2.85
Length of penultimate pair of legs .	8.5

Lophoplax n. g.

The "Siboga" expedition yielded two remarkable Brachyura, which in my opinion, are somehow related to the Goneplacidae, and more particularly to the *Prionoplacinae*. Dr. J. G. DE MAN, to whom I sent the larger ♂, kindly informed me, that he could not identify it with any known form, and that it should rather belong to a new genus *incertae sedis*. I propose to bestow the name *Lophoplax* on it, the diagnostic features of which are as follows: Carapace thickly pubescent, granulate beneath the fur and with the various regions distinct, lateral margins all along with a series of blunt, depressed teeth, front strongly deflexed, bilobed. Chelipeds heavy, meropodite and carpodite pubescent, like the carapace. First segment of abdomen of ♂ entirely occupying the space between the bases of the posterior legs, second segment much narrower, third segment again produced laterally, but not reaching to the coxopodites of the last legs; last segment of sternum exposed at anterior corners.

It is this character of the abdomen, which in my opinion refers the new genus to the present subfamily *Prionoplacinae* and more particularly to genera exhibiting a similar feature, such as *Euryplax*, *Eucratopsis*, *Panoplax*, *Oediplax* and *Homoioplax*, which, however, are distinguished by having at least one tooth less behind the external orbital angle (in *Lophoplax* there are five of such teeth, none of which are spiniform); these genera are, however, with exception of *Homoioplax*, very obscurely known.

The genus is founded on:

1. *Lophoplax bicristata* n. sp. Pl. 12, Fig. 2.

Stat. 77. Borneo Bank, Strait of Makassar. Depth 59 m. 1 ♂.
Stat. 260. 5° 36'.5 S., 132° 55'.2 E. North west of Kei Islands. Depth 90 m. 1 ♂.

The carapace of this species is subquadrate, the distance between external orbital angles being very slightly less than the length of the carapace. The surface of the latter is everywhere concealed under a thick fur of short, club-shaped hairs, which are somewhat longer on the eye-stalks and especially across the front; it is only when this fur is thoroughly removed (as has been done on the right side of the figure) that the sculpture of the carapace is to be

traced out. A mesogastric area, from which a median sulcus passes forward to the front, is distinctly outlined, a cardiac region, flanked by a prominence at either side, is seen behind, while hepatic and branchial regions are not clearly separated one from another, but studded with rather few, scattered granules; most conspicuous, however, and even clearly standing out from the fur, are two obliquely directed, but straight, oblong prominences or thick ridges, one on each protogastric region, pointing outward in the direction of the external orbital angle, but clearly cut off on all sides; it are these ridges which induced me to designate the new species *bicristata*.

The various regions of the carapace are slightly bulging, but on the whole the surface is rather flattened in both main directions, only rapidly falling off on the front, which is vertically deflexed, beyond the transverse row of slender, club-like hairs; there are some few large granules between this row of hairs and the protogastric ridges; the anterior margin is somewhat produced in the middle and slightly notched, the lateral angles are rectangular, not smoothly rounded off, and pass with a deeply-concave curve into the somewhat raised inner orbital margins, that are separated off from the surface of the front by a shallow, oblique sulcus. The breadth of the front is more than twice the width of the small orbit, the supra-orbital border of which is entire, transverse, and provided with a slight prominence, near, and exactly similar to, the blunt external orbital angle, directed forward and little prominent. The eye-stalk is short, piriform, its dorsal surface is thickly clothed with club-like hairs, and the small eye, with intensely-black pigment, is situated chiefly on the ventral side. The lateral margins of the carapace are regularly and not very greatly curved, the breadth of the carapace, however, is enlarged by strong, lobe-like, somewhat flattened teeth, numbering five in all behind each external angle of the orbit and extending to the level of the penultimate pair of legs; these teeth are projecting somewhat beyond the thick fur of the margins of the carapace, but it is only after removal of these hairs that the exact shape of the lateral teeth may be clearly made out: the first of these teeth is separated by a deep notch from the outer angle of the orbit, the second and third are the largest, separated by a rather wide interspace, the second presents a tubercle on its hind margin and is blunt, directed outward, the third exhibits the same shape, but is slightly smaller, more flattened, its plane being oblique to that of the carapace, the fourth is situated close to the preceding, is smaller and still more ridge-like in dorsal view of the carapace, the fifth tooth finally is placed far back, just before the level of the bases of the penultimate pair of legs, and of a semi-circular, flattened shape. Along the margins the surface of the carapace is entirely smooth (beneath the hairs) and much flattened, rising abruptly, with a steep slope, towards the elevated and granulated branchial regions. The hind margin of the carapace is convex and somewhat thickened.

Antennulae folded somewhat obliquely beneath the front, separated by a very narrow septum. Antennae about $1^1/_2$ times as long as the width of the orbit; basal joint of the peduncle as long as the two following together and firmly fixed between the lateral angle of the front and the inner orbital angle, which is not prominent. Epistome distinct, strongly folded transversely, with the hind margin nearly vertical, much wavy. Lateral margins of buccal cavity somewhat

converging backward. External maxillipeds (fig. 2*a*) nearly closing the cavity, ischium longer and broader than merus, the latter with the antero-external angle smoothly rounded, but sowewhat produced outward.

Chelipeds somewhat unequal (the right chela being the larger), as long as, but much stronger than the walking legs, mostly covered with the same fur of closely-set, club-shaped hairs as are observed on the carapace. Meropodite short, inner and upper margin sharp, the former with a series of long hairs, terminating distally into a prominent tooth; outer surface thickly hairy, with a prominent, transverse ridge near the distal end. Carpopodite bulky, upper surface tuberculate or granulate, but the sculpture is concealed mostly beneath the fur; in the middle of the surface we observe a roughly quadrangular space of a callose appearance, entirely devoid of hairs and somewhat raised above the surroundings; the inner angle of the wrist is somewhat produced and an exactly similar tooth is found on the opposite margin of the wrist. Chela strong, palm twice as long as the fingers and longer than high, both margins rounded, but inferior margin slightly keeled and somewhat sinuous where it passes into that of the fixed finger; outer surface in the larger (right) chela smooth for the greater part, though with reticulating, interwoven, ivory-white lines on a darker ground-color, which lines are divided into groups by three or four similar, but longitudinal lines; near upper border the surface is closely covered with the usual fur and a series of ordinary hairs runs along this border and extends to the back of the movable finger, only partly concealed by the fur numerous large, pearly granules are to be seen on the palm; in the smaller chela similar granules, arranged in longitudinal rows, are found all over the outer surface, in the middle of the latter only they are not covered with hairs, and the fingers, especially in the gap between them and at the inner sides, are much more hairy; the fingers are slightly compressed and have retained a greyish hue over their greater part, the inner margins are crenulate, the teeth gradually diminishing in size from base to tip of finger.

Walking legs not very long, the penultimate pair measuring about $1^1/_2$ times the length of the carapace, fringed with club-like hairs. Meropodites six times as long as broad, anterior margin wavy, each prominence capped by a cluster of thick and short hairs; on each leg there are six to eight of such prominences, increasing in height distally, but in the last pair the margin is continually fringed with hairs, and only one subdistal prominence is to be found. Propodites flattened, fringed along both margins. Dactyli very long, not flattened, nearly straight, slightly longer than propodites, fringed with feathered hairs of different length; in the last pair they are not curved at all, longer than the preceding joints and the hairs are longer.

Base of abdomen of ♂ (fig. 2*b*) completely occupying the space between the last legs, second segment considerably narrower, but widening distally, third segment greatly produced laterally, as wide as the first, but not reaching coxopodites of posterior legs; parting from this segment the abdomen narrows considerably, but the lateral margins of the penultimate segment are perfectly parallel, the last segment is semi-elliptical.

This species offers so many characteristic features, that it may be easily recognized. It

bears an unmistakable resemblance to "*Pilumnoplax*" *sculpta* Stimpson [1]), which in my opinion should certainly be included into the genus *Lophoplax*. That it is not identical with the present species is proved at once by the different sculpture: there are two oblong, longitudinal protogastric lobes, instead of the oblique prominent ridges, in STIMPSON's species; besides, the meropodites of the walking legs are considerably broader. In other respects there is a remarkable agreement: the carapace, according to STIMPSON, is also thickly pubescent, the front deflexed, with a supra-marginal fringe of long hairs, the lateral margins are provided "with five tuberculiform or paxilliform teeth"; the description of the chelae agrees nearly wholly with that in the present new species, and "the grooves separating the posterior teeth of the lateral margin are continued for a considerable distance upon the subbranchial region, passing obliquely forward", precisely the same as in *Lophoplax bicristata*; finally the ratio of the length of the carapace to its greatest width is identical in both species (1 : 1.27).

STIMPSON's species (♀ only) was taken near Ousima (Japan).

Dimensions in mm.:

Distance between external orbital angles	4.6
Breadth of front	2.4
Greatest width of carapace (between tips of second epibranchial teeth)	6.—
Length of carapace	4.75

Subfam. RHIZOPINAE.

This group has been first instituted by STIMPSON [2]), and subsequently defined and enlarged by MIERS, ORTMANN and ALCOCK. It is to the diagnosis of the last named author [3]) that I may particularly refer: the species of this subfamily are characterized by a nearly smooth carapace, that is greatly vaulted longitudinally, by the fronto-orbital breadth being narrow, by most defectuous eyes and very often fixed eye-stalks, by the lateral margins of the carapace being entire or nearly so (and never distinctly dentate), and greatly curving inward anteriorly towards the eye-stalks, which are nearly level with the margins of the carapace, so that the orbit is very shallow; the abdomen of the ♂ is usually much narrower than the sternum. This last character has been always considered a safe characteristic of the *Rhizopinae*, in such a way, that, for some years past, Miss RATHBUN [4]) established a new subfamily, *Typhlocarcinopsinae*, chiefly on account of the abdomen of the ♂ being greatly enlarged at the base, so that the first segment exactly covers up the interspace between the bases of the posterior legs. Apart from the fact, that in many genera of the *Rhizopinae* the first segment of the abdomen presents a clear tendency to enlarge and to become broader than the third segment, I see no reason to found a new subfamily, convenient as doing so perhaps may appear to the systematist, on

1) Compare Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 91, pl. 11, f. 3.
2) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 95.
3) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 287.
4) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 345.

such a character [1]): the genus *Typhlocarcinops*, except for this slight difference, is absolutely and intimately related to *Typhlocarcinus* Stimpson, as regards all principal features. Personally I am convinced, that there is no need of such a sharp demarcation between the two genera, as to range them in different subfamilies, and I think it is preferable to include *Typhlocarcinops* into the *Rhizopinae* by a slight modification of the diagnosis of the latter.

The lack of sculpture and the absence of dentation of the carapace, together with the great uniformity in the shape of the small, sharply-keeled chelae, renders the discrimination of the species, and even in some cases of the genera, a rather troublesome undertaking. Alcock has admirably succeeded in drawing up a synoptical key to the genera known to him, from British Indian waters, and it is his key, which is here largely used, with addition of all Indo-Pacific genera, that I know of.

Almost all the *Rhizopinae* are of small size, a few millimetres in breadth, and the majority seems to seek shelter in coral stocks, worm tubes etc.; it is to this habit, that the general reduction of the eyes, going even to complete blindness, is to be attributed. Most of the species are living in rather shallow water, but a few genera are obtainable from rather considerable depths (400—500 fathoms).

Key to the genera:

1. Antennules completely fit into the fossae beneath the front . 2
   Antennules cannot be folded up (so as to be concealed in dorsal view of the animal), as the basal joint entirely fills the fossa 14
2. Epistome of good length, commonly prominent at posterior margin 3
   Epistome short, not prominent at posterior margin 13
3. Eyes well formed, nearly always pigmented 4
   Eyes obsolete, or nearly so; if distinct, the first abdominal segment of both sexes occupies the whole breadth of the last sternal segment 9
4. Eye-stalks movable, not fixed into the orbits 5
   Eye-stalks firmly fixed and completely filling the orbits. Antero-lateral angle of merus of external maxillipeds conspicuously produced outward . . . . . **Ceratoplax** Stimpson
5. Carapace smooth, glossy, lateral margins parallel, fronto-orbital breadth nearly equal to greatest width of carapace. Walking legs elongate, much longer than breadth of carapace . . **Notonyx** A. Milne-Edwards
   Lateral margins of carapace never parallel, fronto-orbital breadth generally not exceeding half the greatest width of the carapace, usually narrower 6
6. Lateral margins of carapace divergent backward, front narrow.

1) Even within the limits of a single genus (f. i. *Goneplax*) the breadth of the abdomen may vary in this respect, that the third segment either touches, or does not reach, the coxopodites of the penultimate pair of legs.

Merus of external maxillipeds suboval, antero-external angle not produced. Abdominal segments of ♂ partly coalesced. **Chasmocarcinus** Rathbun [1])

Lateral margins of carapace strongly convergent backward. 7

7. Margins of carapace everywhere marked by a prominent ridge, fronto-orbital border measuring two-thirds of greatest width of carapace. Merus of external maxillipeds very broad and as long as ischium. Dactyli of two last pair of legs short, about half as long as propodites. . . . . **Paranotonyx** Nobili [2])

Margins of carapace not marked by a prominent ridge, fronto-orbital border measuring one-half of greatest breadth of carapace 8

8. Front bilobed, with longitudinal sulcus. Walking legs almost naked, meropodites of penultimate pair of legs with a tooth at posterior margin, dactyli extremely short, scarcely one-third of the length of the much thickened propodites . . **Selwynia** Borradaile [3])

Front not bilobed, without longitudinal sulcus. Walking legs thickly fringed with hairs, meropodites of all the legs unarmed, dactyli about as long as propodites . . . . . **Paraselwynia** n. g.

9. Carapace much broader than long 10

Carapace only a little broader than long; postero-lateral margins divergent backward 12

10. Postero-lateral margins of carapace mostly parallel. Merus of external maxillipeds not produced at antero-external angle 11

Postero-lateral margins of carapace somewhat convergent backward. Merus of external maxillipeds slightly produced at antero-external angle. Wrist of cheliped with the inner angle spiniform. Ambulatory legs slender, penultimate pair more than $2^1/_2$ times the length of carapace. . . . . **Rhizopa** Stimpson [4])

11. First abdominal segment of ♂ broadened, but by far not filling up the interspace between the coxopodites of the last pair of legs . . . . . **Typhlocarcinus** Stimpson

1) This genus was founded on the species *Ch. typicus*-Rathbun (Bull. Lab. State Un. Iowa, v. 4, 1898, p. 285, pl. 7, f. 3—5), dredged N. of Trinidad, and an additional species, *Ch. obliquus*, (l. c., p. 286, pl. 7, f. 6) was described at the same time, from the Bahamas. In the same year the author added a third species, *C. latipes* (Proc. U. S. Nat. Mus., v. 21, p. 602, pl. 43, f. 5) from Magdalena Bay, Lower California, and in 1901 a fourth species, *Ch. cylindricus* (Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 10, textfig. 1) from Porto Rico.

Until recent years the genus was thus known only from American waters, but now a fifth species has lately been described by Miss RATHBUN (*Ch. cavimanus*, Proc. U. S. Nat. Mus., v. 48, 1914, p. 149) from Philippine waters, from the rather considerable depth of 300 fathoms. The "Siboga" did not obtain any species of *Chasmocarcinus*.

2) Ann. Sc. Nat. (9), t. 4, 1906, p. 298. Founded on the species *P. curtipes* Nobili (pl. 8, f. 7). Hab. Red Sea.

3) Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430. Based on the only species, *S. laevis* (l. c. p. 431, textfig. 112), which inhabits Hulule, Male Atoll.

4) Literature and description of the only known species, *Rh. gracilipes* Stimpson: RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n⁰ 4, 1910, p. 342, textfig. 27. ALCOCK (Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 322) approaches this genus to *Typhlocarcinus* and MIERS (Rep. "Challenger", Brachyura, 1886, p. 235, note) to *Ceratoplax*. Hab. Chinese Seas and Gulf of Siam.

First abdominal segment of ♂ so much broadened as to cover in a narrow stripe the whole breadth of the last sternal segment . . . . . **Typhlocarcinops** Rathbun

12. Anterior margin of front obscurely sinuous. Cornea of eye extremely small, terminal. Flagellum of antenna of ordinary shape, slender and naked. Merus of external maxillipeds not produced at antero-external angle . . . . . **Xenophthalmodes** Richters

Anterior margin of front distinctly bilobed. Cornea of eye larger, placed ventrally at tip of eye-stalk. Flagellum of antenna markedly plumed, thick. Merus of external maxillipeds produced at antero-external angle . . . . . **Mertonia** Laurie

13. Eyes minute, orbits placed ventrally, not visible from above. Merus of external maxillipeds produced at antero-external angle . . . . . **Scalopidia** Stimpson

Eyes obsolete, orbits visible in dorsal view. Merus of external maxillipeds not produced at antero-external angle. . **Typhlocarcinodes** Alcock

14. Eyes small, but perfect . . . . . **Hephthopelta** Alcock

Eyes reduced to a speck of pigment or unpigmented . . 15

15. Antennules of normal size. Outer border of merus of external maxillipeds strongly convex . . . . . **Camatopsis** Alcock

Antennules enormously thick, the last two segments of the peduncle wider than the lobes of the front. Antero-lateral margins of carapace short, forming a distinct angle with the subparallel and long postero-lateral ones. . . . . **Megaesthesius** Rathbun [1]).

Ceratoplax Stimpson.

1858. *Ceratoplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 96.
1886. *Ceratoplax* Miers. Rep. "Challenger", Brachyura, p. 233.

The genus is distinguished at once by the eyes being well developed, the eye-peduncles fixed, and the antero-external angle of the merus of the external maxillipeds conspicuously produced. Otherwise it bears the greatest resemblance to *Typhlocarcinus* and *Typhlocarcinops*. As to *Rhizopa*, MIERS thinks that it is scarcely to be separated from *Ceratoplax* and the recent description given by Miss RATHBUN appears to strengthen this presumption, but unfortunately the latter author has not discussed this point. If the two genera turn out to be really identical, the name *Ceratoplax* should disappear, occupying in STIMPSON's paper a place after *Rhizopa*.

The diagnostic features of *Ceratoplax* enumerated above prevent the including of *C. villosa* and *C. leptochelis*, both described by ZEHNTER [2]), into this genus, on account of the eye-

1) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n⁰ 4, 1910, p. 344, based on the species *M. sagedae* (l. c., p. 344, textfig. 30—31, pl. 2, f. 5), found in very shallow water near Singapore.

2) Rev. Suisse Zool., t. 2, 1894, p. 173—174, pl. 7, f. 8 and 9.

stalks being mobile, not fixed, and the antero-external angle of the merus of the external maxillipeds not produced at all; both these species came from Amboyna. *C. villosa* certainly belongs to the *Rhizopinae*, although I am unable to indicate its proper systematic place; *C. leptochelis*, however, is quite another species, and its whole habitus points to *Panopeus* or rather to *Melia*.

Key to the species:

1. Carapace nude and hairless (at least in its central parts). Walking legs scantily fringed	2
Carapace tomentose	6
2. Postero-lateral margins of carapace subparallel. Ratio of length of carapace to greatest breadth as 1 : 1.3	3
Postero-lateral margins of carapace convergent backward. . .	4
3. Outer surface of palm smooth and polished, except for a few depressed granules inferiorly	*C. ciliata* Stimpson
Outer surface of palm of cheliped with 4—5 longitudinal rows of granules. Back of movable finger with a group of granules at the base	*C. punctata* Baker [1])
4. Ratio of length of carapace to greatest breadth as 1 : 1.3. Meropodite of cheliped with a subdistal tooth, carpopodite angulate at inner angle. Dactyli of last pair of legs apparently not curved backward	*C. laevis* Miers [2])
Ratio of length of carapace to greatest breadth as 1 : 1.6. Dactyli of last pair of legs curved backward	5
5. Fronto-orbital breadth more than one-half of greatest breadth of carapace, front faintly bilobed, greatest width of carapace situated anteriorly. Lateral angles of third abdominal segment of ♂ acute	*C. fulgida* Rathbun [3])
Fronto-orbital breadth equal to, or less than, one-half of greatest breadth of carapace, front perfectly straight at anterior margin, greatest width of carapace situated further backward than in preceding species. Lateral angles of third abdominal segment of ♂ rectangular	*C. truncatifrons* Rathbun
6. Antero-lateral margins of carapace passing angularly into postero-lateral ones. Outer surface of palm smooth	*C. arcuata* Miers [4])
Outer surface of palm with large granules	7
7. Eyes unpigmented	*C. hispida* Alcock [5])

1) Transact. Roy. Soc. South Australia, v. 31, p. 176, pl. 23, f. 2. Hab. unknown.

2) Zool. H. M. S. "Alert", Crust., 1884, p. 244, pl. 25, f. C. Hab. Arafura Sea, 32—36 fathoms. Probably identical with *Notonyx nitidus* A. Milne-Edwards.

3) Proc. U. S. Nat. Mus., v. 48, 1914, p. 146. Hab. Philippines, 83 fathoms.

4) Zool. H. M. S. "Alert", Crust., 1884, p. 243, pl. 25, f. B. Hab. Port Darwin, 12 fathoms.

5) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 321; Ill. Zool. "Investigator", Crust., prt 10, pl. 61, f. 4; Rathbun, K. Dansk Vid. Selsk. Skr., 7. Raekke, Afd. 5, nº 4, 1910, p. 342. Hab. Palk Strait and Gulf of Siam, in depths of a few fathoms.

Eyes pigmented. Coxopodites of walking legs dorsally with pectinated processes . . . . . *C. granulosa* Mc Gilchrist [1]).

1. *Ceratoplax ciliata* Stimpson. Pl. 11, Fig. 2.

Literature: Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 320.
Rathbun, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 342.

Stat. 162. West coast of Salawatti, near northwest New Guinea. Depth 18 m. 1 ♂.

The specimen rather well agrees with Alcock's description and with Miers' figure [2]) (the diagnoses, if anyone is given, of Walker and Cano, cited by Alcock, could not be consulted by me), but it is considerably larger than that of Miers, whose specimen was only 8.5 mm. broad and 6.5 mm. long.

The carapace is much arched longitudinally, especially in its anterior part, and straight transversely. Towards the margins it is covered with short hairs, like the subhepatic and subbranchial regions, but the central parts of the carapace are smooth. There is a trace of a cervical groove, situated far backward, and at either end of this an irregular depression, covered with very short hairs, forms the most conspicuous marking of the carapace; there is further a transverse hairy line behind the front and the surface of the latter is obscurely divided by a short longitudinal sulcus.

The front is deflexed; its free edge regularly arched (fig. 2*a*), but not notched in the middle in my specimen, as Alcock states; across its surface a transverse row of long hairs is to be observed, and this row is continued on the supra-orbital margin and further laterally and backward along the antero-lateral margins of the carapace. The eye-stalks are piriform, the eyes distinct, but in dorsal view of the animal nothing is seen from the eye, as this is chiefly developed on the ventral side of the eye-stalk; its pigment is of a dark sepia tint, not black. The antero-lateral margins of the carapace are regularly arched and divided into three portions by two faint notches; the subparallel postero-lateral margins are much more obsolete and somewhat granulate, and at the transition between the anterior and posterior part the carapace reaches its greatest breadth, which is 1.3 times its length; the posterior margin is somewhat wavy, slightly convex in its middle part.

Antennulae folded transversely beneath the front. Antennae very short, peduncle free, not fixed to the front or to the inner orbital lobe. Epistome distinct. Lateral margins of buccal cavern greatly convergent backward. External maxillipeds broad, antero-external angle of merus conspicuously produced outward, exognath about half as broad as ischium, which latter is longitudinally grooved in the middle, about $1^1/_2$ times as long as broad, and slightly narrower than the merus.

Chelipeds subequal, bulky, but shorter than the walking legs. Meropodite short, mostly smooth, but granulate towards the borders; upper border with a row of long hairs, which row

1) Ann. Mag. Nat. Hist. (7), v. 15, 1905, p. 263; Alcock & Mc Gilchrist, Ill. Zool. "Investigator", Crust. prt 11, 1905, pl. 74, f. 2. Hab. Gulf of Martaban, 61 fathoms.

2) Rep. "Challenger", Brachyura, 1886, pl. 19, f. 3.

terminates distally into a triangular, erect tooth. Carpopodite likewise granulate towards the margins, inner angle sharpened, but not produced, with a tuft of hairs projecting beneath it. Chela (fig. 2*b*) high; palm nearly as high as long and longer than the fingers, upper and under border rounded, not keeled, both surfaces smooth and shining, but the lower part of the outer surface is occupied in its proximal part by a few depressed granules, particularly in the left chela, similar granules are seen running in a longitudinal row near and parallel to the under border of the chela, and there are also some crowded and small granules near the upper border, which is provided with a row of long hairs, continued for some distance on the back of the movable finger; the fingers are short, not much curved, bisulcate both at inner and at outer surface, and the crenulations of the fixed finger are larger than those of the opposite one.

The ambulatory legs are moderately elongate and not much differing in length, the penultimate pair being little more than twice as long as the carapace; all the legs are fringed with coarse, yellow hairs, especially along the last three joints. Meropodites with some transverse rugosities on the upper surface, four times as long as broad, unarmed near the distal end; in the last pair the meropodite is hairless along the greater part of the anterior margin, the posterior margin is provided all along with numerous hairs, exceeding frequently in length the breadth of the meropodite. Dactyli of all the legs conical, falciform, shorter than preceding joints, thickly fringed with hairs; those of the last pair are nearly straight, but not curved dorsally; their shape is somewhat obscured by the coating of long hair.

The first segment of the abdomen of the ♂ (fig. 2*c*) is broadened, but clearly falls short of the coxopodites of the last pair of legs; the second segment is much narrower; the third again widens to the breadth of the first segment and projects into two somewhat acuminate prominences; the following segments gradually decrease in width, but increase in length; the terminal segment is semi-elliptical, longer than broad.

This species inhabits shallow waters, in the Chinese Sea, the Gulf of Siam, the Andaman Sea and Torres Straits.

Dimensions in mm.:

Fronto-orbital distance	8.—
Width of front between eye-stalks	4.5
Greatest breadth of carapace	14.5
Length of carapace	11.—

2. *Ceratoplax truncatifrons* Rathbun. Pl. 12, Fig. 1.

1914. *Ceratoplax truncatifrons* Rathbun. Proc. U. S. Nat. Mus., v. 48, p. 147.

Stat. 193. Sula Besi, Sula Islands, east of Celebes. Depth 22 m. 2 ♂, 5 ♀.

This small species is at once recognized by its remarkably smooth and shining carapace (at least in the ♂, in the ♀ the carapace is crowded with small punctae), that is perfectly bare; there are only some hairs across the front and the eye-stalks, and the lateral margins are shortly pubescent, like also the subbranchial regions, and of a ruddy brown colour.

The carapace is almost semi-cylindrical longitudinally, but completely straight in transverse direction. The various regions are scarcely to be made out, but there is some indication of a cervical groove, situated far behind, and traces of gastro-hepatic and branchio-hepatic sulci.

The front is perpendicularly deflexed, its free edge is perfectly truncate (fig. 1*a*) and the lateral angles rounded, subrectangular. Supra-orbital margin transverse. Orbit shallow, small; eye-stalk piriform, very thick in the middle; the small eye with its light brown pigment is lying at the ventral side of the tip of the ocular peduncle. In the specimen measured by Miss RATHBUN the fronto-orbital distance is exactly one-half the greatest width of the carapace, but in my specimens this distance is usually somewhat larger. The antero-lateral margins of the carapace are $1^1/_2$ times as long as the postero-lateral ones, entire and conspicuously divergent backward, so that the ratio of length of carapace to greatest width is 1 : 1.6, much greater than in the preceding species. At the level of the greatest breadth the lateral margins are much less sharply defined and convergent backward, in an individually varying degree: in the adult ♂ and in some small ♀ this convergency is much more marked than in other individuals, so that in the former group the convex posterior margin of the carapace is proportionately shorter than in the second group.

Antennules transversely folded beneath the front; antennae short, scarcely outreaching the width of the orbit. Epistome distinct, vertical, its free edge straight. Lateral margins of buccal cavity parallel. External maxillipeds smooth and glossy (fig. 1*b*), antero-external angle of merus conspicuously produced outward and forward; exognath more than one-half as broad as ischium, thick, vaulted transversely.

Chelipeds markedly unequal in the apparently adult ♂ (the left being much the larger), in the remaining examples they are equal in size. Meropodite short, inner and upper border unarmed, but hairy; carpopodite broader than long, inner angle sharply produced, hairy; chelae (fig. 1*c, d*) entirely smooth and bare, save for some sparse hairs along the borders of smaller chela; palm carinate at upper border, especially proximally, and with a longitudinal, low keel running very near the under border; fingers compressed, crenulate at inner margins, the crenulations being much less pronounced in the adult ♂ (here figured) than in the other individuals, both fingers, especially the fixed one, of a lighter colour than the palm, which must perhaps be ascribed to their original colour (red?) having disappeared in alcohol preservation.

Walking legs of the same build as in *C. ciliata*, but much less hairy. Meropodites slender, nearly naked, but with some hairs at the distal end of the posterior margin. Dactyli of first pair straight, those of second and third pair very faintly curved, in last pair curved backward and upward.

Abdomen of ♂ (fig. 1*e*) very narrow, the first segment, that is almost linear, scarcely measuring one-third of the breadth of the last segment of the sternum; the third segment is very little projecting outward, so that its lateral angles are right.

This species with its relatively broad and very shining carapace is easily recognizable; it is most nearly related to *C. fulgida* Rathbun, from which it is, however distinguished by differences, enumerated by Miss RATHBUN and also partly mentioned in the key to the genus, given a few pages before.

C. truncatifrons has been discovered by the "Albatross" in a depth of 22 fathoms, in Philippine waters.

Dimensions in mm.:

	♂	♂	♀	♀	♀
Fronto-orbital breadth	2.75	2.2	2.85	2.6	2.5
Width of front at anterior margin	1.4	1.—	1.35	1.3	1.1
Greatest breadth of carapace	5.5	3.85	5.6	5.2	4.4
Length of carapace	3.4	2.5	3.2	3.1	3.—
Posterior border of carapace	4.3	3.3	5.2	4.5	3.5

The last specimen bears a few eggs, which are rather large (0.25—0.33 mm. in diameter).

Typhlocarcinus Stimpson.

1858. *Typhlocarcinus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 95.

This genus very much resembles *Ceratoplax*, but the eyes are so greatly reduced as to be almost obliterated, and the pigment has completely disappeared, or nearly so; besides, the antero-external angle of the merus of the external maxillipeds is not at all produced. Quite recently Miss RATHBUN [1]) described a new species of *Typhlocarcinus*, which in important facts disagrees with the original understanding of the genus: the eyes are black and terminal, the merus of the external maxillipeds is produced at the antero-external angle, the carapace well sculptured, punctate, pubescent; the transition between antero- and postero-lateral margins of the carapace is marked by an obtuse tooth. Leaving this aberrant species aside there remain three species, which are already discriminated by ALCOCK; I cannot, however, agree with him in separating the species on account of the antero-lateral borders of the carapace being toothed or entire, as this criterium is not always reliable.

Key to the species:

1. A faint pigment speck nearly in the middle of the subcircular eye-stalk. 2.
   No pigment speck in the eye-stalk, the latter of a piriform shape. Inner angle of wrist of cheliped produced, dentiform. Animal of a ruddy-brown colour . . . . . *T. rubidus* Alcock [2])
2. Ratio of length of carapace to breadth 1 : 1.6. Lateral margins of buccal cavity divergent backward; exognath of external maxillipeds narrow (one-fourth the breadth of ischium). Chelae almost smooth, walking legs little hairy; dactyli of last pair curved upward and backward . . . . . *T. nudus* Stimpson
   Ratio of length of carapace to breadth 1 : 1.3. Lateral margins of buccal cavity subparallel; exognath of external maxillipeds broader (about one-third the breadth of ischium). Large chela of ♂ smooth, smaller one pubescent; both chelae of ♀ pubescent; walking legs fringed with hairs; dactyli of last pair straight, not curved . . . *T. villosus* Stimpson.

1) *T. craterifer* Rathbun, Proc. U. S. Nat. Mus., v. 48, 1914, p. 147. Hab. Philippine waters, depth 80 fathoms.
2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 323. Hab. Bay of Bengal, depth 20—65 fathoms.

1. *Typhlocarcinus nudus* Stimpson. Pl. 13, Fig. 1.

1858. *Typhlocarcinus nudus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 96.
1900. *Typhlocarcinus nudus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 322.
1910. *Typhlocarcinus nudus* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 343, pl. 1, f. 6, textfig. 29.

Stat. 71. Macassar. 1 ♂, 2 ♀.
Stat. 174. Waru Bay, north-east coast of Ceram. Depth 18 m. 1 ♀ juv.

The carapace of this species is strongly and regularly curved in a longitudinal direction, nearly straight transversely, and the regions are indistinct: the surface of the front is furnished with a rather long and deep median groove, reaching in the youngest ♀ of Stat. 71 even beyond the middle of the carapace; a general gastric region is faintly outlined and defined posteriorly by an interrupted, short cervical groove, at either end of which a conspicuous, curved depression is observed, a cardiac area, broader than the gastric region, is also visible. The whole surface is smooth and glabrous, but the margins, especially the antero-lateral ones, are rather thickly fringed with club-shaped and feathered hairs, and within the reach of these hairs crowded granules occur.

The carapace is rather broad, the greatest width being 1.6 times its length, and the fronto-orbital breadth occupies nearly one-half of the breadth of the carapace. The front is not quite twice as broad as either orbit, deflexed, with the anterior margin straight and deeply notched in the middle. Orbits high, semi-elliptical, completely filled by the inflated eye-stalks, which show a very faint pigment, shining through the integument, somewhat beyond the middle of the peduncle, but only visible in anterior view of the animal; external orbital angles completely absent. Antero-lateral margins of carapace strongly divergent backward and, at the transition to the parallel postero-lateral ones, separated into three blunt teeth, the median of which is the most conspicuous. Posterior margin convex.

Antennulae and antennae very small, the peduncle of the latter standing in the very wide inner orbital gap and fused with the median part of the firmly-fixed eye-stalk, the flagellum of the antenna is only $1^1/_2$ times as long as the width of the orbit. Epistome rather long, vertical, inferior edge entire. Lateral margins of buccal cavity diverging backward. External maxillipeds (fig. 1 *a*) with the ischium much longer and broader than the subquadrate merus, the antero-external angle of which is not produced, subrectangular; exognath unusually narrow, as Alcock rightly observed, rod-like, and only about one-fourth as broad as the ischium.

Chelipeds stout, unequal (at least in the adult ♂, in which the left is the larger), smooth and nearly hairless; the only hairs being observed are those along the upper and inner border of the arm, beneath the inner and at the outer angle of the wrist and along the back of the movable finger. Arm unarmed; inner angle of wrist produced; palm of smaller chela (in the ♂) as long as, but that at the other side somewhat longer than, the fingers; in the ♀ the chelae are nearly equal and apparently smooth in the adult specimen, but in the young individuals the right (smaller) chela is somewhat more hairy than the left; upper border of palm and under margin of the somewhat deflexed fixed finger sharply keeled, and this inferior keel is continued

for some distance on the palm, gradually passing to its outer surface towards the articulation with the wrist; fingers compressed, sharp, crenulate at inner margins.

Ambulatory legs moderately elongate, the penultimate pair measuring three times the length of the carapace. Meropodites unarmed near distal end, four times as long as broad, nearly hairless, except in the last pair; carpo- and especially propodite elongate, fringed along anterior margin and along posterior margin of propodite, but nearly hairless in the case of the penultimate pair; dactyli slender, falciform, little curved, hairy, and as long as preceding joints, those of the last pair are strongly bent upward and somewhat backward.

The first abdominal segment of the ♂ (fig. 1*b*) is very short, linear, and broader than the third segment, which is little produced laterally; from the third segment to the terminal one the abdomen is regularly tapering.

This species has been originally recorded from Hongkong, ALCOCK examined specimens from several British Indian localities (Karachi, coast of Mekrán and Madras, Sandheads and Andamans) and Miss RATHBUN from Singapore and the Gulf of Siam.

Dimensions in mm.:

	♂	♀	♀
Fronto-orbital breadth . . .	2.85	2.75	2.2
Greatest width of carapace .	6.8	6.6	4.8
Breadth of front	1.2	1.15	1.—
Length of carapace	4.3	4.2	3.3

2. *Typhlocarcinus villosus* Stimpson. Pl. 13, Fig. 2.

Literature: ALCOCK, l. c., p. 322.
RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 343, textfig. 28.

Stat. 53. Bay of Nangamessi, north coast of Sumba. Depth down to 36 m. 1 ♀.
Stat. 285. South-east coast of Timor. Depth 34 m. 1 ♂.

This species is readily distinguished by means of the following particulars:

1° The carapace is much narrower, its breadth being only $1^1/_3$ times the length; the margins are fringed, but entire in my specimens, not notched; and the surface is almost entirely glabrous. According to ALCOCK, however, the margins are notched, and the surface is pubescent and here and there granulate.

2° The longitudinal furrow on the surface of the front bifurcates further backward, and this is almost the only trace of a subdivision of the carapace.

3° The lateral margins of the buccal cavity are subparallel; the antero-external angle of the merus of the external maxillipeds (fig. 2*a*) is very much rounded off ("well marked" according to ALCOCK), so that the lateral margin passes regularly into the anterior one, as in Miss RATHBUN's figure; the exognath is broader, and about one-third of the width of the ischium.

4° The chelipeds are more hairy; at least in the apparently adult ♂ the left (smaller) chela is thickly covered with club-shaped hairs, whereas the right is smooth and glabrous; the wrist is fringed at both margins with similar hairs.

5° The ambulatory legs are much more hairy than in the preceding species; the hairs are

longer, club-shaped or feathered; it is especially the last pair of legs which is thickly fringed. A remarkable feature of this species is the gradual decrease in length of the dactyli from the first to the fourth pair of walking legs[1]). In the last pair the dactyli are wholly straight, not curved upward and backward.

The general ivory-white colour of the animal is variegated on the legs by some sharply-defined, ruddy-brown patches, at least in the ♂, not in the (young) ♀. Firstly there is such a patch on the upper border of the meropodites of the chelipeds; the first pair of walking legs is devoid of them; on the meropodites of the second pair again a large patch is found along the upper border; the meropodites of the third pair are deeply coloured over the whole distal half of the dorsal surface and this colour extends anteriorly over the upper border; in the last pair of legs the brown colour is observed all over the under surface of mero-, carpo- and propodite; on these last legs, as well as on the chelipeds, the hairs implanted on the coloured parts are of the same hue, as if impregnated by the colouring matter. These very conspicuous patches, which have apparently lost nothing of their vigour during an alcohol preservation of almost twenty years, afford perhaps an important diagnostic of the species[2]).

6⁰ The third abdominal segment of the ♂ is somewhat more produced laterally than in *T. nudus*.

The present species inhabits the sea near Hongkong, the Bay of Bengal and the Gulf of Siam.

Dimensions in mm.:

	♂	♀
Fronto-orbital breadth	2.65	—
Greatest breadth of carapace	5.7	5.1
Width of front	1.2	—
Length of carapace	4.25	3.75
Length of dactyli of first pair of walking legs	1.65	—
Length of dactyli of second pair of walking legs	1.55	—
Length of dactyli of third pair of walking legs	1.45	—
Length of dactyli of fourth pair of walking legs	1.—	—

Typhlocarcinops Rathbun.

1909. *Typhlocarcinops* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 112.
1910. *Typhlocarcinops* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n⁰ 4, p. 345.

This genus was considered by its author to represent a new subfamily, *Typhlocarcinopsinae*, on account of the first abdominal segment of the ♂ covering the whole width between the last pair of legs. As has been already remarked (p. 199—200) I cannot appreciate this character to such a degree as to remove the present genus from the *Rhizopinae*. Apart from the diagnostic named *Typhlocarcinops* is extremely alike such genera like *Ceratoplax* and *Typhlocarcinus*; the eyes are sometimes well developed and pigmented, but faint and almost obsolete in other cases.

1) It is this character that also characterizes a species of *Typhlocarcinops* (*T. decrescens* Rathbun, Proc. U. S. Nat. Mus., v. 48, 1914, p. 151), which of course is readily recognizable by the first segment of the abdomen entirely occupying the space between the last pair of legs.

2) It may be added, that this brown colour is also observed on the free margin of the epistome.

As to the abdomen, it has been repeatedly stated in the present paper, that both in *Ceratoplax* and in *Typhlocarcinus* the first segment in both sexes shows a tendency to extend laterally; this has only been accomplished more fully in *Typhlocarcinops* and occurs also in my specimens of *Typhlocarcinodes*.

Five species of *Typhlocarcinops* have now been described by Miss RATHBUN [1]). The "Siboga" collected one of these and, besides, two new species.

Key to the species:

1. Fronto-orbital width about equal to, or more than, half the greatest width of the carapace 2
   Fronto-orbital with much less than half the greatest width of the carapace 6
2. Postero-lateral margins of carapace parallel or divergent backward 3
   Postero-lateral margins of carapace convergent backward; antero-lateral margins with three groups of denticles or with blunt teeth 5
3. Whole animal sparingly hairy. Eye-stalks almost circular; eye faintly pigmented; orbits somewhat sloping backward. Front widening anteriorly. Antero-external angle of merus of external maxillipeds not produced. . . . . *T. canaliculata* Rathbun [2])
   Animal densely fringed. Eye-stalks piriform. Front not widening distally 4
4. Dactyli of walking legs regularly decreasing in length from the first to the fourth pair; propodites shortened. Eyes faintly pigmented or quite pale. . . . . *T. decrescens* Rathbun
   Dactyli of penultimate pair of legs distinctly exceeding in length those of preceding and of following pair; propodites elongate, narrowing distally. Eyes distinct, black, terminal. . . . . *T. angustipes* n. sp.
5. Antero-lateral margins of carapace long, denticulate, "three interruptions in the denticles forming three teeth"; surface of carapace rather well sculptured; breadth about 1.3 times its length. Eyes pigmented, dark . . . . . *T. marginata* Rathbun [3]).
   Antero-lateral margins of carapace shorter than postero-lateral ones, very obtuse, with three blunt tubercles, widely separated; at the level of the posterior tubercles the carapace attains its greatest breadth, which is about $1^1/_2$ times its length. Eyes faintly pigmented . . . . . *T. transversa* n. sp.

1) A sixth species (*T. piroculata*) in reality belongs to *Typhlocarcinodes*.

2) Proc. Biol. Soc. Washington, v. 22, 1909, p. 112; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^0 4, 1910, p. 345, pl. 12, f. 16, textfig. 32. Hab. Gulf of Siam.

3) Proc. U. S. Nat. Mus., v. 48, 1914, p. 152. Hab. Philippines, 27 fathoms. The author remarks in the course of the diagnosis: "this species is the only one of the genus in which the postero-lateral margins converge towards the posterior margin", but on the very page two species are described, in which the same character is observed, and in one of these (*T. angustifrons*) it is even more pronounced than in *T. marginata*.

6. Lateral margins of carapace entire. Eyes pigmented, well developed. *T. ocularia* Rathbun [1])
Lateral margins of carapace with two teeth, granulate. Eyes very faintly pigmented . . . . . *T. angustifrons* Rathbun [2]).

1. *Typhlocarcinops transversa* n. sp. Pl. 13, Fig. 3.

Stat. 47. Bay of Bima, north coast of Sumbawa. Depth 13—31 m. 1 ♂, 1 ♀.

This species is broader than any other known species of the genus, the breadth of the carapace measuring nearly $1^1/_2$ times its length. The surface of the carapace is somewhat pubescent, more so the ♀ than in the ♂, and densely fringed with long, club-shaped hairs along the margins, especially the antero-lateral ones; on the other hand are front and eye-stalks nearly destitute of hairs. The front is longitudinally grooved, which groove bifurcates distally; for the rest there is scarcely any trace of regions on the longitudinally-vaulted carapace.

The free edge of the front is on the whole straight, slightly wavy in anterior view, and longer than either orbit. This small orbit is, as usual, completely filled by the firmly-fixed eye-stalk, which is of a semi-circular shape and provided with a faint speck of pigment near the distal end; this pigment is stronger in the ♀ specimen. As is of general occurrence in the *Rhizopinae*, the orbits and eye-stalks do not form an interruption in the general outline of the carapace; the antero-lateral margins are directed nearly straightly outward near the orbits, then curve back, and form three blunt teeth, only visible, however, after removal of the row of hairs and the pubescence covering them. These teeth are separated by very wide interspaces; the median one, which is of the same build as the first, is situated nearer to the third than to the first; the third tooth is the smallest, crest-like, longitudinal, and marks the transition to the postero-lateral margins of the carapace, that are somewhat converging backward; it is near these margins that the carapace is roughly granulate. The posterior margin is convex, thickened.

Antennulae and antennae are shaped quite like those of *Typhlocarcinus*. The epistome is distinct, vertical, its free edge not crenulate or wavy; the septum between the endostome ridges is very distinct. Lateral margins of buccal cavity parallel. Merus and ischium of external maxillipeds (fig. 3*a*) pubescent and granulate, as is also the exognath; external maxillipeds completely closing the buccal cavity; merus subquadrate, as broad as, but shorter than, ischium, antero-external angle somewhat produced; exognath about one-third the width of ischium.

Chelipeds strong, longer than the first pair of walking legs in the ♂. Meropodite with upper border unarmed, but granulate and hairy, like inner border, under surface with numerous granules. Wrist short, granulate and hairy near the rounded inner margin. Chelae equal, but larger in ♂ than in ♀, sharply keeled above; in the ♀ both surfaces of palm are entirely covered with a short pubescence, intermingled with longer hairs at outer surface, and, together with this pubescence, the palm is everywhere granulate; in the ♂ the same occurs, but a patch in the middle of the outer surface is devoid of pubescence and entirely smooth; the

1) Proc. U. S. Nat. Mus., v. 48, 1914, p. 153. Hab. Philippines, 50 fathoms.
2) Proc. U. S. Nat. Mus., v. 48, 1914, p. 153. Hab. Philippines, 135 fathoms.

fingers are shorter than the palm, for the greater part glabrous, greatly compressed, sharply crenulate at inner margins, back of mobile finger and under margin of opposite one with a row of hairs, which are much longer on the movable finger; in the ♂ the fixed finger does not present a longitudinal row of hairs.

Walking legs not much elongate. Outer margin of carpo- and propodite and inner margin of latter fringed with the usual, club-shaped hairs; penultimate pair of legs with some scattered hairs only, propodites of this pair longest, narrowing distally; dactyli as long as preceding joints, styliform, hairy, little curved, those of last pair shortest, straight, but curved upward near the tip.

First abdominal segment of both sexes very broad, reaching to the bases of the last pair of legs, but almost linear, third segment in ♂ (fig. 3*b*) little produced laterally, remaining segments gradually narrowing.

This species in its general appearance seems nearest to *T. marginata*, of which no figure as yet is published, but in the new species the antero-lateral margins are obtuse, and present three blunt, widely-separated teeth instead of the apparently closely-grouped, denticulate teeth of Miss RATHBUN's species; the carapace of *T. transversa* is wider, the eyes are not prominent and dark. In both these species the fronto-orbital distance is approximately one-half of the greatest breadth of the carapace.

Dimensions in mm.:

	♂	♀
Fronto-orbital distance . . .	4.1	4.1
Greatest breadth of carapace .	8.—	8.—
Breadth of front	1.85	—
Length of carapace	5.4	—

2. *Typhlocarcinops decrescens* Rathbun. Pl. 13, Fig. 4.

1914. *Typhlocarcinops decrescens* Rathbun. Proc. U. S. Nat. Mus., v. 48, p. 151.

Stat. 133. Lirung, Talaut Islands. Depth up to 36 m. 1 ♀.
Stat. 279. Roma Island, north of Timor. Depth 36 m. 1 ♂ juv.

This species is characterized by the following points:

1° The whole animal, at least the adult ♀, is covered by a short, ruddy-brown pubescence; the long, feathered hairs along the margins of the carapace and along all the legs are of the same colour.

2° The greatest breadth of the carapace is only 1.2 times the length, so that the animal is much narrower than the preceding species; the fronto-orbital breadth is nearly exactly one-half of this greatest breadth (according to Miss RATHBUN's measurements the width across front and orbits is less).

3° The lateral margins of the carapace are more strongly pronounced than in *T. transversa*, and, when cleaned, present two very faint notches, widely separated; behind the last notch the lateral margins are parallel or even slightly divergent backward, widening again a little above the bases of the last legs.

4° In the (young) ♂ there is a distinct speck of pigment a little beyond the middle of the inflated eye-stalk, but in the ♀ this pigment is altogether absent. Miss RATHBUN denies the presence of pigment also in the (adult) ♂.

5° The external maxillipeds are more slender than in *T. transversa* and do not completely close the buccal cavity, the antero-external angle of the merus is not produced, but well marked.

6° Chelipeds very much pubescent. Meropodite unarmed; inner angle of wrist pronounced, not produced; chelae equal in size, both in my young ♂ and in the ♀, but very unequal, as Miss RATHBUN observes, in the adult ♂; palm sharply keeled at upper and under border, granulate and hairy at outer surface, in the adult ♀ with a bare patch in the middle, inner surface smooth and bare in both sexes; fingers glabrous, shorter than palm; fixed finger greatly compressed and high at the base; movable finger with a row of long hairs along proximal half of back.

7° Walking legs short, densely hairy, also the penultimate pair, which is as long as preceding pair; propodites short; dactyli diminishing gradually in length from the first to the fourth pair, those of last pair scarcely curved upward.

8° First abdominal segment of ♀ not linear, but in the middle third longer than the next segment, the lateral portions greatly attenuated. Abdomen of ♂ not different from that of preceding species.

Miss RATHBUN records specimens of this species from the Sulu Archipelago, not far from the "Siboga" locality.

Dimensions in mm.:

	♂ juv.	♀
Fronto-orbital breadth . . .	2.55	3.1
Greatest breadth of carapace .	5.1	6.25
Width of front	—	1.45
Length of carapace	3.75	5.3

3. *Typhlocarcinops angustipes* n. sp. Pl. 7, Fig. 5.

Stat. 133. Lirung, Talaut Islands. Depth up to 36 m. 1 ♀, with eggs.
Stat. 274. 5° 28'.2 S., 134° 53'.9 E. North of Aru Islands. Depth 57 m. 1 ♂ juv., 2 ♀.

This new species is very much alike *T. decrescens*; it is even, at least in the specimens of Stat. 274, covered with the same ruddy-brown pubescence, but the following differences are of importance:

1° The anterior margin of the carapace is fringed with long hairs, not nearly naked, as in *T. decrescens*.

2° The carapace is somewhat broader, its breadth being 1.3 times the length; the fronto-orbital distance is distinctly more than half the greatest breadth of the carapace.

3° The lateral margins are entire, not notched, and faintly divergent backward.

4° The eyes are very distinct, black and terminal.

5° The external maxillipeds (fig. 5*a*) are broader, the merus is produced at the antero-external angle, broader but shorter than the ischium and provided with club-shaped, feathered hairs

along the outer margins. The buccal cavity narrows backward, so that the lateral margins are not parallel, but convergent behind.

6° The walking legs are more slender, and the propodites of second and especially of third pair elongate, narrowing distally (fig. 5*b*); the dactyli of penultimate pair are longer than those of first pair and scantily hairy.

Dimensions in mm.:

	♀	♀
Fronto-orbital breadth . . .	2.5	3.1
Greatest breadth of carapace .	4.4	5.55
Width of front	1.2	—
Length of carapace	3.3	4.4

In its measurements (length of carapace to breadth as 1 : 1.3, fronto-orbital breadth about 55 % of breadth of carapace) this species much resembles the type species, *T. canaliculata* Rathbun, from the Gulf of Siam, but this species is much less hairy, the eye-peduncles are almost circular, not piriform and the eyes faintly pigmented, the front widens anteriorly (which is not at all the case in the new species, in which on the contrary the lateral margins of the front greatly diverge backward), the lateral margins of the buccal cavity are parallel and the antero-external angle of the merus of the external maxillipeds is not produced at all, finally the second pair of walking legs, not the penultimate one, is the longest, and the inner angle of the wrist of the chelipeds is not pronounced.

Xenophthalmodes Richters.

1880. *Xenophthalmodes* Richters. Beitr. Meeresfauna Mauritius etc., p. 155.

The genus much resembles *Ceratoplax*, *Typhlocarcinus* and *Typhlocarcinops* in the general shape of the carapace, in the eye-stalks being firmly fixed, the eyes extremely small or absent, the chelae compressed, high, partly pubescent and granulate on outer surface; the first abdominal segment, however, does not reach so far outward as to cover the whole breadth of the last sternal segment; the lateral margins of the carapace are entire and diverging backward, so that the greatest breadth is lying far behind; this greatest breadth does not much exceed the length of the carapace; the dactyli of the walking legs regularly decrease in size from the first to the fourth pair.

The "Siboga" collected an apparently new species of this genus.

Key to the species:

Carapace practically bare, except along the margins. Free edge of epistome thickened, not much prominent, external margin of merus of external maxillipeds passing with a distinct angle into anterior margin. First abdominal appendages of ♂ concealed beneath abdomen. *X. moebii* Richters [1])

Carapace covered with a close pubescence. Free edge of epistome lamellar, prominent, vertical, external and anterior margins of merus

1) L. c., p. 155, pl. 16, f. 29, pl. 17, f. 1—5; Miers, Proc. Zool. Soc. London, 1884, p. 12; de Man, Notes Leiden Mus., v. 12, 1890, p. 68, pl. 3, f. 5; Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 324. Hab. Mauritius, Red Sea, Persian Gulf, Malabar and Coromandel coast, Gulf of Martaban and Andamans.

of external maxillipeds forming together a continuous arcuate line. First abdominal appendages of adult ♂ projecting a long way beyond terminal segment of abdomen . . . . . *X. dolichophallus* n. sp.

1. *Xenophthalmodes dolichophallus* n. sp. Pl. 14, Fig. 1.

Stat. 4. Djangkar, east coast of Java. Depth 9 m. 5 ♂ (1 juv.), 1 ♀ juv.
Stat. 51. Madura Bay, west coast of Flores. Depth 54—90 m. 1 ♂.
Stat. 205. Lohio Bay, Buton Strait, south of Celebes. Depth 22 mm. 1 ♂ juv.

I am not quite certain about the validity of my species, for RICHTERS' and DE MAN's descriptions of *X. moebii* disagree in some points, but fortunately I could examine the specimen of the latter author in the Leiden Museum. Both the species are very much alike: the greatest breadth of the carapace, which is found far behind, only little exceeds its length, the fronto-orbital border is less than one-half this greatest breadth, the eye-peduncles are globular, there are scarcely any traces of subdivisions on the carapace, the chelae are largely compressed, carinate, and the dactyli of the walking legs decrease regularly in size from the first to the fourth pair. [1]) The following points, however, appear to afford specific features:

1° The carapace is bare in *X. moebii*, only thickly fringed along anterior and lateral margins; in the new species it is covered with a close pubescence, which, after removal, turns out to conceal a fine granulation along the lateral margins.

2° The front, according to RICHTERS and ALCOCK, is bilobed in anterior view, in *X. moebii*; my specimens agree in this respect perfectly with RICHTERS' fig. 1 on pl. 17, viz.: there are two rounded lobes, separated by a rather deep notch. In DE MAN's specimen, which is referred to *X. moebii*, the anterior edge of the front is, on the contrary, scarcely notched in the middle and regularly convex.

3° *X. moebii* is perfectly blind, according to RICHTERS; DE MAN observed, however, a very small, punctiform eye at the end of the eye-stalk, but chiefly ventral; ALCOCK, again, states that the species, of which 13 specimens from different localities could be examined, are devoid of eyes, but in one very young specimen the eye is indeed pigmented. In the adult or half-grown "Siboga" specimens there is a very faint speck of pigment on the ventral side of the eye-stalk, but in two very young specimens there is a strongly pigmented eye, even partly visible in dorsal view, larger and more conspicuous than in DE MAN's specimen.

4° In the literature I do not find anything regarding the epistome, except that it resembles that of *Typhlocarcinus*; in the specimen of *X. moebii* the free edge of the epistome is scarcely prominent, thickened. In the new species this edge is markedly prominent, vertical, lamellar, with a longitudinal sulcus in the middle.

5° The external maxillipeds of *X. moebii* are slender, the ischium is not broader than the merus, the latter quadrangular, with a distinct angle between the anterior and the external margin of the merus (see DE MAN, pl. 3, fig. 5*a*). In RICHTERS' figure 5 the ischium is

1) This character has hitherto not been observed in the genus, it occurs also in *Typhlocarcinus villosus* Stimpson (see p. 210) and in *Typhlocarcinops decrescens* Rathbun (see p. 214).

also as broad as the merus, but the antero-external angle of the merus is rounded off and the same is expressly stated by ALCOCK. In the new species (fig. 1*a*) the ischium is decidedly broader than the merus, granulate, as also is the exognath, and the anterior and external angle of the merus form a continuous arched line.

6° ALCOCK states that the wrist of the chelipeds of *X. moebii* is acuminate at inner angle; in the Leiden Museum specimen this angle is pronounced, not decidedly prominent. In *X. dolichophallus* this inner angle, though its exact shape is not easily to be made out, on account of the numerous feathered hairs inserted here, is distinctly spiniform, more so than in the other species. In RICHTERS' species the chelae are unequal and the outer surface is smooth and polished (ALCOCK); in the new species the hands are equal and the outer surface is to a greater or lesser extent pubescent and granulate.

7° Finally, the most remarkable are the much elongated first abdominal appendages of the ♂ of the new species. In adult and half-grown individuals these appendages reach rather far beyond the terminal segment of the abdomen (fig. 1*b*), even to the posterior margin of the buccal cavity; in very young specimens (length of carapace about 2.5 mm.) they are entirely concealed beneath the abdomen. Neither RICHTERS nor ALCOCK have noted anything of this kind in *X. moebii*, and it is likewise not to be observed in DE MAN's specimen. It is this character, together with the apparently different development of the eye and the shape of the merus of the external maxillipeds, which induced me to establish a new species for the "Siboga" specimens, the most conspicuous feature of which is expressed by the specific name.

Dimensions in mm.:

	♂
Fronto-orbital breadth.	3.2
Greatest breadth of carapace . . .	7.2
Length of carapace.	6.5
Breadth of anterior margin of front .	1.55

Mertonia Laurie.

1906. *Mertonia* Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 423.

This genus comes very near to *Xenophthalmodes*, as the lateral margins of the carapace are diverging backward; but the fronto-orbital distance is more than half the greatest breadth of the carapace, the eyes, though minute, are quite distinct, visible in ventral view, and the antennae are unusually long, stout and provided with long, feathered hairs.

Only one species is known:

1. *Mertonia lanka* Laurie. Pl. 16, Fig. 2*a*.

1906. *Mertonia lanka* Laurie. L. c., p. 424, pl. 1, f. 11.
1910. *Mertonia lanka* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 342, pl. 2, f. 4.

Stat. 273. Pulu Jedan, east coast of Aru Islands. Depth 13 m. 1 ♂.

LAURIE's description and exact figures are quite sufficient to recognize this species, but the following remarks may be of some use:

The carapace is practically smooth and polished, but there is a stripe of closely-set granules along the lateral margins; on the cardiac region three small depressions are found, placed in an aequilateral triangle. The lateral margins are somewhat more divergent backward than is shown in LAURIE's figure; they are, together with the anterior margin, fringed with rather stiff setae. The orbits are visible from above and completely filled by the firmly-fixed eye-stalks; these eye-stalks are granulate above, like the lateral margins of the carapace, but completely smooth ventrally, the two parts are separated by a sharpened edge, along which the transverse row of setae passes across orbits and front. The fronto-orbital distance is more than one-half the greatest breadth of the carapace, but to a lesser degree in my specimen than in LAURIE's. Only in ventral view of the animal a small, but very distinct, black spot of pigment, near the end of the eye-stalk, and concealed beneath the transverse row of setae, denotes an eye; it has been accurately figured in LAURIE's figure 11*a*.

The antennules are very small, somewhat obliquely folded beneath the vertically-deflexed, deeply-bilobed front. The antennae are remarkably long (nearly half as long as the carapace), very stout, the flagellum (fig. 2*a*) consists of ten joints, the second of which is by far the longest; all are provided with very long, feathered hairs, except at the ventral surface; these hairs give the antennae a superfical resemblance to little fir-trees. The epistome is distinct, its free edge prominent and entire. The lateral margins of the buccal cavity distinctly converge backward and so do the external maxillipeds; the antero-external angle of the merus is produced laterally and the anterior margin is somewhat concave (not convex as in LAURIE's figure), the exognath is half as broad as the ischium.

The chelipeds are rather small, subequal; meropodite short, unarmed at upper border; upper surface of wrist roughened by depressed granules, especially near the produced inner angle of the wrist; similar granules are found at outer surface of palm, except in the central portion, which is smooth; upper border of palm sharpened; under border of chela forming a convex line, carinate along fixed finger and distal part of palm; height of palm somewhat less than horizontal length and about equal to length of fingers; fixed finger very high at base, largely compressed, provided with 3—4 obtuse teeth at inner margin; movable finger not flattened, nearly unarmed at inner margin; both fingers of a light sepia colour, darker than the palm.

Walking legs fringed with silky setae, like those of the carapace, but longer, especially in the case of the last pair; all pairs are subequal in length. The dactyli are not flattened, those of the first and second pair are the longest [1]). The propodites are unusually short, the posterior margin being much convex. The meropodites are unarmed; those of the fourth pair the broadest, but rapidly narrowing distally, in their proximal part the meropodites of this pair are half as broad as long, as has been accurately depicted in LAURIE's figure.

The abdomen of the ♂ is narrow; all segments are distinct; the first segment attains only one-fourth of the breadth of the last sternal segment; the third segment is little produced

1) Miss. RATHBUN remarks: "second leg similar to the third, but slightly longer, the additional length being in the dactyl".

laterally and as broad as the first, but much longer; the following segments increase in length gradually; the terminal segment is elongate, only half as broad at the base as the penultimate segment, and twice as long as broad.

The present species has been first recorded from Ceylon (Gulf of Manaar); afterwards it was obtained in the Gulf of Siam. The "Siboga" specimen is somewhat larger than those previously known.

Dimensions in mm.:

Fronto-orbital distance	4.—
Anterior margin of front	1.55
Greatest breadth of carapace	7.6
Length of carapace	5.5

Notonyx A. Milne-Edwards.

1873. *Notonyx* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 268.

The carapace in this genus is almost entirely hairless, the fronto-orbital distance is wide and nearly equals the greatest width of the carapace, the piriform eye-stalks present minute, though quite distinct, eyes, and the walking legs are elongate, and, like the carapace, almost devoid of hairs.

The eye-peduncles are movable, not firmly fixed within the orbits, and this character, which refutes the name *Rhizopinae*, has long been considered the exclusive possession of the present genus; we now know, however, that movable eye-stalks occur in some other genera: *Paranotonyx* Nobili, *Chasmocarcinus* Rathbun, *Selwynia* Borradaile and in a new genus, allied to the latter, which I propose to call *Paraselwynia*.

A diagnosis of the present genus is given by Miers [1]) and Alcock [2]).

Key to the species:

Breadth of carapace about 1.3—1.5 times its length, postero-lateral margins slightly concave and somewhat convergent backward. Inner angle of wrist of cheliped produced, turned forward. Abdomen of ♂ broadly triangular, with the third segment broadest, and thence rapidly tapering . . . . . *N. nitidus* A. Milne-Edwards

Breadth of carapace only about 1.2 times its length, postero-lateral margins parallel. Inner angle of wrist of cheliped blunt, not prominent. Abdomen of ♂ oblong, scarcely narrowed towards terminal segment, with the third segment scarcely broader than the second . . . . . *N. vitreus* Alcock.

1. *Notonyx nitidus* A. Milne-Edwards.

1873. *Notonyx nitidus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 269, pl. 12, f. 3.
1886. *Notonyx nitidus* Miers. Rep. "Challenger", Brachyura, p. 236.
1900. *Notonyx nitidus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 319.

1) Rep. "Challenger", Brachyura, 1886, p. 235.
2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 318.

Stat. 47. Bay of Bima, north coast of Sumbawa. Depth 13—31 m. 1 ♂, 1 ♀.
Stat. 181. Ambon. Depth 54 m. 3 ♀ (2 juv.).
Stat. 285. South-east coast of Timor. Depth 34 m. 1 ♀ with eggs.

The carapace of this elegant species is smooth and glabrous; under strong magnification here and there some punctae are seen; a cervical groove is present, concave forward, and at either end some oblique depressions are found. The carapace is straight transversely, except at the lateral branchial regions, which are strongly sloping, the hepatic regions are bulging, and the anterior part of the carapace obliquely deflexed.

The fronto-orbital distance occupies the greater part of the breadth of the carapace, as the front alone at its practically straight, but very slightly convex, margin measures about one-half of the said breadth, and the eye-stalks, which are bottle-shaped and provided with very distinct eyes, perfectly visible in dorsal view, are elongate. Upper orbital margins transverse, passing almost imperceptibly into the antero-lateral margins of the carapace, which are firstly strongly divergent backward and carinate, but soon curve strongly backward, becoming more and more obtuse and finally disappearing altogether when passing into the very slightly convergent postero-lateral margins, which again turn outward above the bases of the middle pairs of walking legs. Posterior margin of carapace sinuous, as long as the greatest breadth of the carapace, which is lying at the end of the anterior third of the latter.

Antennules folded quite transversely; antennae longer than orbits. Infra-orbital margin somewhat wavy in its lateral part, beneath the pigmented part of the eye. Epistome distinct, vertical. Lateral margins of buccal cavity convergent backward, anterior angles acute. Merus of external maxillipeds subquadrate, antero-external angle not prominent, slightly rounded; according to Milne-Edwards' figure and to the express statement of Alcock the merus should be as long as the ischium, but in my specimens it is slightly shorter.

The chelipeds are unequal in the ♂ (the right being the larger), but equal in the ♀. Meropodite with a transverse ridge near the distal end of the upper border, preceded by a row of feathered hairs (in the ♀ this transverse ridge is not observed in my specimens; both Milne-Edwards and Alcock state the presence of a subdistal prominence at the meropodite, but the first author describes shortly the abdomen of the ♂ and figures that of the ♀, though he could examine only a single specimen, and the sex of Alcock's only individual is not noted). Wrist with a pronounced inner angle, turned forward. Palm greatly compressed and carinate below, like the fixed finger, rounded above; in the larger chela of the ♂ it is longer than the fingers; both are entirely smooth and hairless.

Walking legs long and slender, 2^{d} and 3^{d} pair equal, with elongate propodites and dactyli, the latter not flattened, nearly straight, feebly curved towards the tip, those of last pair entirely straight; some scattered hairs are found along the margins.

Abdomen of ♂ triangular; first segment covered beneath the carapace; third segment broadened, with acute lateral angles, twice as long as preceding segment; thence the abdomen rapidly but regularly tapers towards the triangular terminal segment.

Milne-Edwards describes his specimen as being of a rosy colour with longitudinal and oblique reddish stripes; my specimens are uniformly ivory-white. Notwithstanding some more

hairiness of the animal, it seems almost certain, that *Ceratoplax laevis* Miers [1]) is identical with the present species, a surmise already expressed by MIERS himself, and perfectly suggested by the author's figure. Unfortunately it is not stated, whether the eye-stalks are movable or not.

The species has been originally recorded from New Caledonia; the "Challenger" dredged it from a depth of 28 fathoms south of New Guinea; ALCOCK obtained a specimen from the Persian Gulf. "*Ceratoplax*" *laevis* was secured in the Arafura Sea, depth 22—26 fathoms. The Leiden Museum contains two specimens (♂ and ♀) of *N. nitidus*, collected by Dr. SEMMELINK near Banda in 1881.

Dimensions in mm.:	1 ♂	2 ♀	3 ♀	4 ♀	5 ♀
Fronto-orbital distance . . .	4.9	4.9	6.4	3.3	4.6
Anterior margin of front .	2.3	2.4	3.2	1.5	2.1
Breadth of carapace . . .	6.—	6.2	9.—	4.4	5.8
Length of carapace . . .	4.6	4.7	6.—	3.4	3.9

N° 1 and 2 are from Stat. 47, n° 3 and 4 from Amboyna, n° 5 from Stat. 285; the latter specimen is bearing eggs, which are of nearly exactly the same size as those of the following species (0.37 mm.).

2. *Notonyx vitreus* Alcock.

1900. *Notonyx vitreus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 319.
1903. *Notonyx vitreus* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 61, f. 3.

Stat. 51. Madura Bay, west coast of Flores. Depth 69—91 m. 1 ♀ with eggs.
Stat. 164. South of Salawatti, near north-west New Guinea. Depth 32 m. 1 ♂ juv.

In the following particulars this species differs from the preceding:

1° The carapace is proportionally narrower, its breadth being not more than 1.2 times its length; the postero-lateral margins are subparallel, not somewhat converging backward; the antero-lateral margins are more obtuse than in *N. nitidus* and keeled only along a very short distance behind the external orbital angles [2]).

2° The merus of the external maxillipeds is indeed shorter than the ischium (ALCOCK), more distinctly so than in *N. nitidus*, and the antero-external angle of the former is more pronounced, though not at all prominent, and less rounded off.

3° The meropodite of the chelipeds is without a transverse ridge near the distal end of the upper border, and the feathered hairs, observed in *N. nitidus* along upper and inner border are nearly absent in the present species. The inner angle of the wrist is not prominent.

4° The meropodites of the walking legs are slightly broader and the various joints are even more destitute of hairs than in the preceding species; the dactyli of the last pair are slightly curved, not straight.

5° The abdomen of the ♂ is oblong, not triangular, with the lateral margins not much con-

1) Zool. H. M. S. "Alert", 1884, p. 244, pl. 25, f. C. See p. 203.

2) It must be a slip of the pen, that ALCOCK says: "front nearly half the breadth of the carapace"; in reality it is much narrower, and, like in *N. nitidus*, slightly less than half the fronto-orbital distance.

verging towards the tips; the third segment is as long as, and only very little broader than the second segment, and its lateral angles are right, not acute.

The animal is of a smooth, shining appearance and of a uniform ivory-white colour, like *N. nitidus*.

Alcock records a single specimen from the Andamans, depth 53 fathoms.

Dimensions in mm.:

	♂	♀
Fronto-orbital distance . . .	2.5	5.7
Anterior margin of front . .	1.2	2.75
Breadth of carapace	2.9	7.8
Length of carapace	2.4	6.7

The eggs of the ♀ are not very numerous and rather larger (0.37—0.38 mm.).

Paraselwynia n. g.

The "Siboga" collection contains a single crab, which is certainly related to the species *Selwynia laevis* Borradaile [1]): the carapace is broadly oval, the lateral margins are entire and strongly arched, the eyes distinct, well pigmented and their peduncles not fixed into the orbits. Yet there are several points warranting even a generic distinctness from *Selwynia*: the walking legs are narrower, and very heavily fringed, the dactyli are long and slender; the merus of the external maxillipeds is subquadrate, with the antero-external angle distinct, rectangular, not greatly rounded off, and the carpus is inserted at the antero-internal angle, not nearly in the middle of the anterior margin, as in *Selwynia*; finally the front is not bilobed, nor grooved in the middle.

1. *Paraselwynia ursina* n. sp. Pl. 14, Fig. 2.

Stat. 258. Tual, Kei Islands. Depth 22 m. 1 ♀.

This species is broadly oval, its breadth being nearly 1.4 times its length, with the lateral margins greatly arched, entire, and the fronto-orbital distance less than half the breadth of the carapace (in *Selwynia laevis*, according to the figure, this fronto-orbital distance is somewhat more than half the breadth of the carapace); it is very slightly tumid in transverse direction, longitudinally it is strongly curved in its anterior third. The whole carapace is entirely hairless, of a dull appearance, smooth, with a few groups of large pits, distributed symmetrically: two of these groups are situated on the protogastric, two on the branchial regions, and one on the cardiac area; the cervical groove is represented, about in the centre of the carapace, by some interrupted, transverse depressions.

The front is bent downward and not at all sulcate, its anterior margin is perfectly straight, not bilobed, and about as broad as the two orbits together, its lateral angles are somewhat obtuse. The orbits are small, marginal, transverse, the eye-stalks shortened, freely movable, provided at the end with a perfectly developed, normal

1) Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430—431, textfig. 112.

eye, the cornea of which is chiefly situated on the ventral side of the stalk. The lateral margins of the carapace are much convex, converging backward in their distal half, obtuse, not keeled, and not dentate or notched, but puckled and pitted in an irregular way, the side walls of the cephalothorax are for the most part covered with a thick toment of longer and shorter, bearded hairs, growing gradually thicker in their terminal half; it are hairs of this kind which are largely distributed on the maxillipeds (so as to render obscure their exact shape) and along the chelipeds and walking legs. The hind margin of the carapace is convex, but somewhat concave in the middle, accompanied by a very faintly-impressed line near the margin.

Antennules very minute, neatly folded up beneath the front, perfectly transverse (in *Selwynia* they are, according to BORRADAILE, folded somewhat obliquely). Antennae longer than antennules, slender, hairless, about twice the length of the orbit. Epistome strongly folded transversely, its hind margin thickened, not laminar and freely prominent, sulcate in the middle. Antero-lateral angles of buccal cavity much rounded, lateral margins subparallel, thickened, adjacent parts of pterygostomian regions granulate beneath the toment.

External maxillipeds scarcely gaping, ischium longer, and also somewhat broader, than merus (fig. 2*a*); when the hairs covering the outer surface are removed, the merus turns out to be subquadrate and widely different from that of *Selwynia laevis*, as depicted by BORRADAILE: its length is about equal to, and not greatly less than its breadth, the antero-external angle is sharpened, not greatly rounded off, somewhat prominent, near the internal margin some long, slender, feathered hairs are inserted; the palp is very long (as in *Selwynia laevis*), but the carpus, instead of being inserted nearly in the middle of the anterior margin of the merus, is implanted at the antero-internal angle of the latter.

In my only specimen (a ♀) the chelipeds are perfectly equal, rather bulky. Meropodite very short, not projecting beyond the carapace, inner and outer margin thickly fringed, outer surface granulate, upper margin unarmed. Wrist globular, with some scattered granules near inner margin, inner angle very slightly prominent, but concealed beneath hairs. Chela rather long, inflated, rounded at the margin; palm twice as long as the fingers, smooth for the greater part, but the upper and basal portion of the inner surface thickly tomentose, like the under portion of the outer surface, but beneath the soft fur numerous granules are observed in the latter case; fingers short, straight, but strongly hooked towards the tip, fixed finger more strongly crenulate at inner margin than opposite one, both fingers tomentose, especially along the back of the movable finger (where also sharp granules are found near the base) and in the gap of the fingers (fig. 2*b*). In *Selwynia (laevis)* the chelae appear to be hairless and the fingers are nearly as long as the palm.

Walking legs slender, but short; first to third pair equal in length, little exceeding length of carapace, last pair inconsiderably shorter. All the joints are thickly fringed with hairs of the usual kind of this species. Meropodites slender, quite unarmed (in *Selwynia laevis* a small tooth is found in the distal part of the posterior margin); carpo-, and especially propodite, flattened, broadened; dactyli thick, conical, (with the tip slightly curved, horny and hairless), equal in length to the preceding joints, whereas they are short, claw-like in *Selwynia (laevis)*, dactyli of last pair somewhat flattened and quite straight.

Abdomen of ♀, like the sternum, naked on outer surface, but heavily fringed along the margins, covering at base two-thirds of the interspace between the bases of the last pair of legs, segments gradually increasing in length from first to sixth segment, terminal one semi-elliptical, twice as long as preceding joint.

The animal is of a uniform ivory-white colour in alcohol preservation, the toment is greyish-white, the fingers are chestnut-brown.

Dimensions in mm.:

Fronto-orbital distance . . .	4.75
Anterior margin of front . .	2.25
Breadth of carapace	11.5
Length of carapace	7.7

Scalopidia Stimpson.

1858. *Scalopidia* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 95.
1881. *Hypophthalmus* Richters. Abhandl. Senckenb. Gesellsch., Bd 12, p. 429.
1900. *Scalopidia* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 325.

Scalopidia belongs to those genera of the *Rhizopinae* in which the epistome is indistinct and not well separated off by a prominent margin from the buccal cavity. The flattened, anteriorly not much deflexed carapace with its strongly marked regions, the flattened and sharply-edged chelae, one of which is very much larger than the other, and the spider-like, posteriorly spinous, walking legs render the only species of the genus very easily recognizable.

1. *Scalopidia spinosipes* Stimpson. Pl. 14, Fig. 3.

Literature: Alcock, l. c., p. 325.
Laurie, Rep. Pearl Oyster Fish. Ceylon, prt 5, 1906, p. 424.
Rathbun, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 344, pl. 2, f. 2.

Stat. 19. Labuan Tring, west coast of Lombok. Depth 18—27 m. 1 ♂.
Stat. 71. Macassar. Depth up to 32 m. 1 ♂ juv.

Contrary to what is the usual case in the *Rhizopinae* the carapace is much flattened and the front nearly horizontal, very short and not prominent. The general outline of the animal resembles that of *Xenophthalmodes* in being semi-circular, with the lateral margins of the carapace divergent backward, but, whereas in *Xenophthalmodes* the maximum breadth of the carapace only very little exceeds its length, it is 1.35 times this length in the present species. The surface is bare and, on close examination, it proves to be everywhere punctate, and the various regions are defined by broad, shallow depressions [1]). These are best developed around the cardiac area, which is of a rhombic shape and presents an indistinct, broad, but low, transverse ridge; there are further two inner branchial lobes; branchial and hepatic regions are separated by a broad sulcus, which gives off a branch passing anteriorly to a large depression behind the orbit; a median groove passes from the front backward and

1) Alcock states: "the regions are distinctly mapped out by fine grooves", but these grooves are not so clearly marked in my specimens.

bifurcates distally; the mesogastric area has two shallow depressions. A cervical groove does not exist, at least in the adult specimen. The front is extremely short, almost linear, obliquely-deflexed; in dorsal view it consists of two little-prominent lobes, separated by a shallow notch, but in front view (fig. 3*a*) the anterior margin is perfectly straight and measures one-fourth of the breadth of the carapace. The small orbits are not visible in dorsal view; the eye-stalks are very short, cylindrical, firmly fixed and provided with a well-developed, normal eye. The obtuse lateral margins of the carapace, rendered rugose, like the surface of the front, by numerous flattened granules, are much convex in the anterior two-thirds of their course, but distally they are subparallel to each other and disappear altogether[1]); in their vicinity the epibranchial and subbranchial regions, both granulate, imperceptibly pass into one another. The posterior margin of the carapace is very long, convex, but concave in the middle part, and accompanied along its whole course by a fine ridge. The lateral margins are provided with a fringe of fine hairs, continued across the front.

The two free joints of the antennular peduncle are much elongate and slender, and scarcely to be folded within their fossae. The stem of the antennae is short, coalesced with the underlying parts, but the last joint of the peduncle is free, and bears a long flagellum, three times as long as the transverse diameter of the orbit. The epistome is very short, almost linear; its hind edge is not projecting, somewhat thickened, in front view consisting of two deeply-concave parts, separated by a lobe. The lateral walls of the buccal cavity are feebly convergent backward, concave in their anterior part and connected with the epistome by a prominent lobe. External maxillipeds (fig. 3*b*) large, granulate towards inner margin of ischium and merus; the former is broad, longitudinally grooved, with sharpened antero-median angle and somewhat longer than the merus, which latter is broadly auriculate at its antero-external angle; the palp is long and, if inflexed, easily reaches the ischium. The exognath is for the most part visible in normal position and only half as broad as the ischium.

The chelipeds, at least in the adult ♂, are largely unequal (compare figs 3*c* and 3*d*), the right being by far the larger, but in the young ♂ the chelae, though of a similar shape as those of the adult, are nearly equal in size. The meropodite is short, but strongly increasing in size distally, outer border not sharpened and provided with sharpened granules, upper border terminating in a subdistal, sharp tooth, inner border granulate, and, in the case of the large cheliped, provided with a small tooth, about in the middle of the margin. The wrist is of a rhombic shape, short, with a few punctae in the proximal part of the upper surface, and the inner angle transformed into a sharp point. The large chela (fig. 3*c*) is very high, smooth and glossy, with a few scattered, large pits on the outer surface, upper and especially lower border sharply keeled, proximal lower portion projecting backward in a sort of elbow-like prominence, inferior border of chela very deeply sinuous, palm little longer than high, with a very large and deep depression on the inner surface, near the base of the immovable finger; fingers shorter than palm, compressed; lower finger much deflexed, curved upward at tip, proximal half of cutting margin provided with four teeth, the second of

1) I have failed to detect a minute spine, denoted by ALCOCK, at the transition of antero- and postero-lateral margins.

which is the smallest, and the fourth or distal one by far the largest and the most acuminate, distal half of cutting margin finely crenulate; inner margin of mobile finger likewise with four teeth, the basal of which is the most conspicuous and the fourth, which is acuminate, situated opposite the large, sharpened tooth of the lower finger, distal half of inner margin likewise finely crenulate. Smaller chela (fig. 3*d*) weak, upper and under border not keeled, the latter fringed with hairs and much less sinuous than in the large chela; palm deeply pitted at outer surface and shorter than fingers; the latter longitudinally grooved, teeth of fixed finger sharp, rather equal in size, but with very minute serrulations scattered between the larger teeth, movable finger more obtusely toothed.

Walking legs slender, penultimate pair three times as long as the carapace, fourth pair the smallest. Meropodite long, in the middle pairs $3^1/_2$ times as long as broad and inflated near the base, shortly hairy, upper margin minutely serrate, near distal end usually provided with a small, curved tooth, inferior margin with a series of 7—8 sharp teeth, the axis of which is perpendicular to the long axis of the meropodite; the proximal one of these teeth is situated on the ischiopodite; in the case of the last pair of legs these inferior teeth are almost or completely absent. Carpo- and propodite shortly hairy, the latter elongate in the case of the penultimate pair of legs, but greatly shorter than the carpopodite in the last legs. Dactyli compressed, fringed at the margins, about as long as propodites, straight, but almost imperceptibly curved at tips, those of last legs curved upward and backward.

Sternum strongly granulate, not hirsute. Abdomen of ♂ (fig. 3*e*) narrow; first segment linear, about half the breadth of the sternum, third segment projecting laterally as far as the first segment and with two longitudinal grooves, third, fourth and fifth segment partly coalesced, as Miss RATHBUN perceived, sixth segment slightly broader than long, with two shoulder-like prominences anteriorly, terminal segment semi-circular, short.

The species was first dredged near Hongkong by STIMPSON, HENDERSON (see ALCOCK l. c.) records it from the Gulf of Martaban, ALCOCK again from Hongkong, LAURIE from the Gulf of Manaar and Miss RATHBUN from the Gulf of Siam. My adult specimen is of the same size as denoted by the latter author.

Dimensions in mm.:

Fronto-orbital distance	8.—	3.6
Anterior margin of front	4.75	—
Breadth of carapace	19.—	7.5
Length of carapace	14.—	5.75
Length of large chela	21.5	4.5
Length of small chela	12.—	4.—
Length of penultimate pair of legs	43.—	—

Typhlocarcinodes Alcock.

1881. *Typhlocarcinus* Miers (nec Stimpson). Ann. Mag. Nat. Hist. (5), v. 8, p. 260.
1900. *Typhlocarcinodes* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 326.
1903. *Caecopilumnus* Borradaile. Faun. and Geogr. Maldive and Laccadive Arch., v. 1, p. 267.
1911. *Typhlocarcinops* (part.) Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239.

With the preceding genus the present one is distinguished by the epistome being sunken, not at all prominent, so that the external maxillipeds nearly encroach upon the antennulae, which latter are very minute, and directed almost longitudinally. The merus of the external maxillipeds is almost circular, distinctly smaller than the ischium, the palp is weak and short, inserted at the antero-internal angle of the merus and the exognath is very narrow, between one-third and one-fourth the breadth of the ischium. Eyes are not or scarcely visible and their peduncles are firmly fixed.

The type species is the Atlantic *T. integrifrons* (Miers [1]), which in two essential features differs from the three species of the "Siboga": firstly the flagellum of the antennulae of MIERS' species is multi-articulate, hairy and longer than the peduncle, whereas in the Indian specimens this flagellum is shorter than the peduncle, almost completely hairless, and made up of very few (5—6) joints; secondly in *T. integrifrons* the abdomen does not entirely cover the last sternal segment, but in my specimens it touches the bases of the last pair of legs [2]).

BORRADAILE first founded a genus *incertae sedis*, *Caecopilumnus*, for the reception of a species, which was provisionally ranged among the Xanthidae, but afterwards [3]) he recognized that his genus was "at least allied to, if not identical with, *Typhlocarcinodes* Alcock".

The genus *Epimelus* A. Milne-Edwards [4]) is certainly very nearly related to *Typhlocarcinodes*. A co-type of the single species, *E. cessaci*, is in the Leiden Museum. It is nearest to *T. hirsutus* (Borradaile), with which it agrees in the strong granulation of the carapace and the lobulation of its lateral margins, in the shape and disposition of antennulae and antennae and in the rather long first abdominal segment, which covers all the space between the last pair of legs. That the genera are not to be considered identical is proved by the following facts: in *Epimelus* the eye-stalks are mobile, cylindrical, as long as the breadth of the front at its base, and provided with a normal eye at the tip; a rather large distance back from the cornea, a spot of pigment is shining through the tegument; secondly the merus of the external maxillipeds is not subcircular, but distinctly rectangular.

The "Siboga" obtained several specimens of the genus, belonging to at last two species. One of these is the "*Caecopilumnus hirsutus*" of BORRADAILE, another specimen is "*Typhlocarcinops*" *piroculata* Rathbun. That Miss RATHBUN's species in reality does belong to the present genus and not to *Typhlocarcinops* I hope to explain further on. Whether a third species, unfortunately only represented by a single ♀, has a right of existence, remains uncertain as long as no further material is available.

Key to the Indo-Pacific species:

1. Carapace granulate, with regions more or less conspicuously indicated, little broader than long. Anterior margin of front rounded, lateral angles absent. Walking legs short and broad,

1) L. c., p. 260, pl. 14, f. 1. Hab. Goree Island, Senegambia.

2) It must be remarked, however, that ALCOCK, who examined a much damaged specimen, expressly states that the abdomen is narrower than the space between the last pair of legs.

3) Fauna Geogr. Maldive and Laccadive Arch., v. 1, 1903, p. 431.

4) Bull. Soc. Philom. Paris (7), t. 2, 1878, p. 227; Exp. "Travailleur" et "Talisman", Brachyures et Anomoures, 1900, p. 76, pl. 15, f. 1—8. Hab. Cape Verde Islands, depth 10—30 metres.

fringed with very long hairs (longer than the breadth of the joint to which they are attached) 2

Carapace almost smooth, somewhat granular only towards the margins, regions scarcely indicated, distinctly broader than long. Anterior margin of front straight, lateral angles present. Walking legs longer and more slender, fringed with rather short hairs *T. piroculatus* (Rathbun)

2. Carapace very strongly and closely granulate, regions defined by fine and deep grooves, postero-lateral margins convergent backward, straight. Surface of front not more hairy than antero-lateral margins of carapace. Eyes exceedingly minute, placed at tips of eye-stalks. Walking legs short, but propodites of last pair of legs longer than broad at the base. . . . . *T. hirsutus* (Borradaile)

Granules on carapace more scattered and much less prominent, regions indistinctly defined by much fainter grooves, postero-lateral margins somewhat concave. Surface of front covered with a rather dense tuft of hairs, which are longer than those found laterally. Eyes completely absent. Walking legs short, propodites of last pair of legs as long as broad at the base. *T. crassipes* n. sp.

1. *Typhlocarcinodes hirsutus* (Borradaile). Pl. 15, Fig. 3.

1903. *Caecopilumnus hirsutus* Borradaile. Faun. Geogr. Maldive and Laccadive Arch., v. 1, p. 269, textfig. 59.

Stat. 51. Madura Bay, west coast of Flores. Depth 54—90 m. 2 ♂.

The carapace of this species is closely granulate, the granules being sharpened near the margins. The pentagonal mesogastric area, which is separated off from the short-necked, bottle-shaped cardiac region by a short and straight cervical groove, is clearly defined; protogastric, hepatic and branchial regions are also developed. The carapace is somewhat vaulted transversely, but much more so in the anterior half of the longitudinal axis, so that the front is deflexed. Its anterior margin is markedly convex, and passes, without presenting lateral angles, into the diverging lateral borders; the transverse diameter of the front at its base is exactly one-half of the fronto-orbital distance; its surface is provided with a short longitudinal groove, uniting backward with the two sulci defining the anterior part of the mesogastric region, and crossed by a row of hairs, which, like all those along the lateral margins of the carapace, on the subhepatic and subbranchial regions and on the legs, are feathered and very flexible, but not particularly longer than the rest. The orbits are very shallow and completely filled by the pear-shaped, dorsally granulate eye-stalks, which bear a very minute eye at their tips[1]). The antero-lateral margins of the carapace are sharpened, much diverging backward, and at the transition between them and the obtuse,

1) BORRADAILE in his figure (fig. 59*e*) depicts a spot of pigment, a little distance back from the cornea, and I observed the same in my specimens.

straight, converging postero-lateral borders three lobes, separated by minute notches, and granulate more strongly than the rest of the carapace, mark the level, at which the carapace attains its greatest breadth, which is only about 1.25 times the length. The posterior margin is straight, somewhat concave in the middle-third.

The antennulae are remarkably small, closely folded beneath the front and almost longitudinally directed, as is usual in the genus. The antennae are likewise small; the flagellum consists of 7 joints, nearly hairless, the last one tipped by one or two long hairs, and the whole flagellum is not longer than the two last joints of the peduncle, which joints are of equal length and provided with several very long, feathered hairs along their margins [1]). An epistome is not developed, the merus of the external maxillipeds nearly touching the bases of the antennae, but owing to the presence of strong endostome ridges the anterior margin of the buccal cavity is thickened in the middle and projects backward. The lateral walls of the buccal cavity are divergent backward, not convergent as depicted by BORRADAILE. The external maxillipeds are well figured by this author (fig. 59*c*), though I should say, that the ischium is in reality somewhat longer; between them only a narrow linear space is left and so the maxillipeds are exactly parallel, the surface of the ischium is smooth, its lateral margins are perfectly parallel, and the anterior margin is markedly concave; the merus is nearly circular in outline, with the outer and anterior margin much rounded, its surface is granulate; the carpus is, as usual, inserted at the antero-internal angle of the merus, very short, like the two following joints, so that the whole palp of the maxilliped is scarcely visible in the normal position; the exognath is very slender and only one-fifth of the breadth of the ischium.

The chelipeds are equal, strongly granulate. Arm short, much hairy along the margins and at the under surface, upper border with a subdistal notch, marking off a short, conical tooth. Wrist small, not toothed at inner angle, upper surface with pearly granules. Still larger are these granules on the outer surface of the chela, where they are placed in indistinct longitudinal rows (which arrangement is not clearly shown in BORRADAILE's figure 59*b*); on the inner surface of the palm the granules are fine and closely grouped in the middle; the fingers, which are about as long as the palm are hooked at the tip, roughly crenulate at opposite margins, and longitudinally grooved at outer surface, the grooves being separated by continuous or finely granulate ridges.

The walking legs are short, the penultimate pair of legs being scarcely $1^1/_2$ times the length of the carapace. Mero-, carpo- and propodite, especially the former, are heavily fringed with feathered hairs, and, like the carapace, they are granulate at upper surface. The propodite is much broadened, but still longer than broad, even in the last pair of legs (fig. 3*a*). Dactyli somewhat compressed, those of the first to third pair subequal, curved, those of last pair shorter, styliform, nearly wholly straight.

Abdomen of ♂ (fig. 3*b*) with the first segment very broad and occupying the whole interspace between the posterior pair of legs, not diminishing in height laterally,

1) In BORRADAILE's specimen the flagellum of the antennae seems to be broken off.

second segment narrower, but slightly longer than the first, third segment laterally produced, but the horns do not reach as far outward as the first segment, following segments all distinct, gradually increasing in length, terminal one equilaterally-triangular. The surface of the abdomen, like the sternum, is granulate.

The colour of the animal is a greyish-white, the hairs are colourless.

A single ♀ of this species was formerly collected on the reef at Fadifolu Atoll, Maldives; the "Siboga" obtained two ♂ from a depth between 54—90 metres at the west coast of Flores.

Whether ALCOCK's specimen, the locality of which is not stated, is identical with the present one, is impossible to make out.

Dimensions in mm.:

Fronto-orbital distance. .	3.85
Width of front at base .	1.9
Breadth of carapace. . .	7.25
Length of carapace . . .	5.8
Base of abdomen . . .	4.3

2. *Typhlocarcinodes crassipes* n. sp. Pl. 15, Fig. 1.

Stat. 225c. Lucipara Islands, Banda Sea. Reef. 1 ♀.

It is with some hesitation that a new species is established for the single ♀ obtained, as this is most closely related to the preceding species, but the following points are of importance.

1° The carapace is granulate in a much less conspicuous way, the granules being less numerous and especially not sharpened and prominent towards the margins. The grooves defining the regions, as far as they are visible, present exactly the same course, but are much less distinct. The lateral margins are entire in the middle, not notched, the postero-lateral margins are somewhat concave. The surface of the front is clothed with a dense tuft of feathered hairs, which are longer than those on the eye-stalks or on the antero-lateral margins of the carapace. Eyes are completely absent, not even a speck of pigment is to be observed. On the other hand the shape of the front, of the antennulae and antennae (fig. 1*a*) and of the external maxillipeds exactly agree with what is found in *T. hirsutus*. The middle of the anterior margin of the buccal cavity is not thickened, and its lateral margins are convergent backward, quite like in BORRADAILE's figure of the ♀ of "*Caecopilumnus*" *hirsutus*.

2° The chelipeds are, like those of the preceding species, but the subdistal tooth at the anterior margin of the meropodite is larger and more ridge-like.

3° The walking legs, especially the propodites, are broader, the propodites of the last pair (fig. 1*b*) being even broader than long.

4° The first segment of the abdomen of the ♀ covers the last sternal segment.

It may be, that the differences enumerated are only due to sex, but BORRADAILE's ♀ of "*Caecopilumnus*" *hirsutus* presents a closely-granulate carapace, with the various regions as well and as sharply defined as in the ♂; further, eyes are figured and the shape of the walking legs agrees on the whole with what I found in the ♂ of BORRADAILE's species. But the outline

of the buccal cavity narrowing backward again suggests that my specimen indeed is nothing but the ♀ of the preceding species. We must await more material before this question may be solved; for the present it seems preferable to establish a new species.

Dimensions in mm.:

Fronto-orbital distance . .	4.3
Width of front at base . .	2.1
Breadth of carapace . . .	8.5
Length of carapace . . .	6.5
Base of abdomen	4.2

3. *Typhlocarcinodes piroculatus* (Rathbun). Pl. 15, Fig. 2.

1911. *Typhlocarcinops piroculata* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239, pl. 20, f. 1—2.

Stat. 133. Lirung, Talaut Islands. Depth up to 36 m. 1 ♂.

This species is distinguished at first glance from the two preceding species by the carapace being proportionately broader, by the fronto-orbital distance being distinctly more than one-half the greatest breadth of the carapace, by the great reduction of the granulation and the absence of grooves, and by the postero-lateral margins being almost parallel. The antennulae, the walking legs and the abdomen are also different in the present species.

The carapace is flattened transversely, much convex in longitudinal direction, especially anteriorly, so that the front is strongly deflexed. As has been said, there are no granules on the carapace, except some very minute ones towards the margins, which are slightly raised [1]), and neither are the various regions defined, the only sculpture consisting of a faint longitudinal groove parting from the front and bifurcating distally and in two curved ones, (branchio-cardiac grooves) with the convexities turned towards each other, at the level of the cervical groove.

The front is rather broad, twice as broad as either orbit, narrowing anteriorly, but the anterior margin is but little arched, and lateral angles are distinctly developed (fig. 2 *a*). The eye-peduncles are firmly fixed within the orbits, pear-shaped and greatly bulging at the base. Miss RATHBUN notes small corneae, of which I did not detect any trace, only a rather large speck of pigment within the eye-stalk shining through the tegument, at a little distance back from the tip of the peduncle. The feathered hairs across the front are neatly arranged along the anterior margin and are continued across the eye-stalks and all along the lateral margins of the carapace. The latter are greatly arched, so that the carapace is proportionately broader than in the two preceding species; two faint notches, at the level of the greatest breadth, denote the transition between antero- and postero-lateral margins, and behind these notches the margins are nearly parallel, very faintly converging backward. The posterior margin is very little convex.

Antennulae of the usual shape and in the usual position. Antennae remarkable by the

1) "Sides with a raised, granulate rim" (RATHBUN).

fact, that the last joint of the peduncle is about twice as long as the preceding joint and nearly as long as the flagellum, which consists of only 5 joints (fig. 2*b*); the two last joints of the peduncle are fringed with very long feathered hairs, and the flagellum terminates in a very long hair. Epistome not prominent in the middle, linear. Buccal cavity widening backward. External maxillipeds (fig. 2*c*) much as in the two preceding species, leaving a very narrow space between them; ischium longer than merus, the latter circular, suture between ischium and merus concave; palp short and weak; exognath slender, about one-fourth of the width of the ischium.

Chelipeds equal, small. Arm short, hairy, scarcely toothed near the distal end of the anterior margin; wrist granulate at upper surface, inner angle rounded; chela likewise, but more strongly, granulate at outer surface, granules in longitudinal rows, the ventral one of which extends to the fixed finger and is continued here in the shape of a sharp keel. Walking legs slender, middle pairs more than twice as long as the carapace, fringed with hairs, but not so closely as in the two preceding species; last pair scarcely shorter than preceding legs. Meropodite unarmed; propodites not broadened, with the longest hairs along hind margin; dactyli of all the legs subequal in length, with fine, horny tip.

First abdominal segment of ♂ (fig. 2*d*) as broad as last sternal segment, longest in the median line; second segment only one-third as broad as preceding, but considerably longer; third segment produced laterally, but by far not reaching outward as far as first; next segments offering nothing remarkable.

The species is of the same uniform ivory-white colour as nearly all the members of the subfamily.

I have no doubt that my specimen is identical with "*Typhlocarcinops*" *piroculata*. Miss RATHBUN regarded this species as a member of the genus created by herself in the preceding year, on account of the first abdominal segment reaching to the bases of the posterior pair of legs. I have shown in the two preceding species, that this character also occurs in *Typhlocarcinodes*. Further, in *Typhlocarcinops* the epistome is distinct and, in front view of the animal, proves to be prominent and straight at the hind edge; the antennae are rather long, the peduncle much shorter than the flagellum [1]) and not provided with long hairs; the shape of the merus of the external maxillipeds is more angular and the suture between merus and ischium is straight. It must be admitted, that the present species exceedingly resembles *Typhlocarcinops*.

The species has first been recorded from the Western Indian Ocean (Amirante Islands, depth 34 fathoms). The "Siboga" obtained this species south of the Philippines.

Dimensions in mm.:

Fronto-orbital distance	2.85
Anterior margin of front	1.42
Breadth of carapace	4.95
Length of carapace	3.65
Length of penultimate pair of legs	8.2
Length of last pair of legs	8.1

1) Miss RATHBUN herself remarked that in "*Typhlocarcinops*" *piroculata* the flagellum of the antenna does not exceed the peduncle in length.

Hephthopelta Alcock.

1899. *Hephthopelta* Alcock. Deep Sea Brachyura "Investigator", p. 76.

With *Camatopsis* and *Megaesthesius* this genus is distinguished by the antennulae being too large to be folded up in their fossae beneath the front. The present genus presents well-pigmented, normal eyes, on the ventral side of the movable eye-stalks; the merus of the external maxillipeds is rounded laterally and anteriorly, and the inner angle of the wrist of the chelipeds is largely produced [1]).

Two species of this genus are known, both obtained at rather great depths (175 and 490 fathoms). The "Siboga" collection contains a single specimen, which I take to represent a new species.

Key to the species:

1. Carapace as broad as long. Posterior border of meropodites of first two pairs of ambulatory legs spinulose . . . . . *H. lugubris* Alcock [2])
   Carapace broader than long. Meropodites of ambulatory legs unarmed at posterior margin 2
2. Eye-stalks constricted near corneae, pigment of eye dull. Lower surface of left (smaller) chela flattened, with pronounced margins, the outer margin ending in a spine . . . . . *H. apta* Rathbun [3])
   Eye-stalks not constricted, pigment of eye black. Lower surface of left chela rounded, not flattened. . . . . *H. littoralis* n. sp.

1. *Hephthopelta littoralis* n. sp. Pl. 9, Fig. 3.

Stat. 174. Waru Bay, north coast of Ceram. Depth 18 m. 1 ♀.

The carapace, which is pubescent throughout, with some longer and thicker hairs near the margins, and, save for the very long and straight cervical groove and two branchio-cardiac grooves, does not show any distinct sculpture, is broader than that of *H. apta*: in Miss RATHBUN's species its breadth is 1.2 times, in the present one nearly 1.5 times its length. The anterior third part is rather strongly deflexed, so that the anterior edge of the front, which is straight and measures one-fourth of the total breadth of the carapace, is not visible in dorsal view. The eye-peduncles are cylindrical, shorter than the breadth of the front, somewhat bulging at base and with a perfectly-developed eye at the ventral side of the tip. The fronto-orbital distance is more than one-half the greatest breadth of the carapace and so larger than that of *H. apta*. The lateral margins of the carapace soon curve backward behind the eyes and are

1) Miss RATHBUN (Proc. U. S. Nat. Mus., v. 48, 1914, p. 149) pretends that the narrow plate, intercalated between the fourth and the fifth segment of the sternum of the ♂ and covering the genital canal leading from the coxopodites of the last pair of legs, represents a generic character. The same, however, occurs in the ♂ of *Camatopsis*.

2) Deep Sea Brachyura "Investigator", 1899, p. 77, pl. 4, f. 2; Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 327. Hab. Andaman Sea, 490 fathoms.

3) Proc. U. S. Nat. Mus., v. 48, 1914, p. 148. Hab. Philippine waters, 175 fathoms. Among the differences between this species and *H. lugubris* Miss RATHBUN also cites those taken from the chelipeds, but in ALCOCK's only specimen these were wanting.

diverging towards the bases of the penultimate pair of legs. The posterior margin is strongly sinuous towards both ends.

An epistome is present; its free edge is slightly thickened, but does not project. Basal joint of antennulae small, not inflated (fig. 3*a*), each of the two next joints cylindrical, as long as the eye-stalk. Antennae small, flagellum consisting of about 8 joints, nearly hairless, reaching a little way beyond the orbit. Lateral margins of buccal cavity subparallel. External maxillipeds narrow, widely gaping; ischium longer than merus, the latter oblong, with the antero-external angle not at all produced, palp very strong, carpus and propodus cylindrical and much longer than the short terminal joint; exognath about one-third as broad as ischium, with some long hairs along outer margin.

In my specimen the right cheliped is unfortunately absent; the length of the left exceeds that of the carapace. Meropodite rather slender, unarmed at upper border; wrist short, quadrate, but with the inner angle strongly produced; chela low, palm nearly as long as fingers, pubescent, not flattened at lower border, but in the distal half and along lower finger sharply carinate and hairy; fingers long, compressed, fixed finger nearly straight, with four or five minute teeth, placed at large intervals along inner margin, movable finger somewhat curved, with a row of hairs along the back and unarmed at opposite margin.

Ambulatory legs slender, middle pairs about twice as long as carapace, last three joints heavily fringed, especially at posterior (inner) border. Meropodites unarmed, propodites elongate (except in the last pair of legs), dactyli long, straight, but in the last pair of legs, in which they are longer than the preceding joints, curved backward.

The only ♀ does not bear any eggs. It is of a bluish-white appearance, but the pubescence is of a dusky-brown.

This species, which seems to me to be readily distinguishable by its proportionately broad carapace, is also remarkable by its living in very shallow water (depth 18 metres).

Dimensions in mm.:

Fronto-orbital distance. .	2.75
Length of eye-stalk. . .	0.75
Breadth of carapace. . .	5.25
Length of carapace . . .	3.5

Camatopsis Alcock.

1899. *Camatopsis* Alcock. Deep Sea Brachyura "Investigator", p. 75.

The body in this genus, as in the preceding, is very deep, cubical, and in most respects *Camatopsis* is very nearly allied to *Hephthopelta*, but the eyes, if present at all, are greatly reduced, the eye-stalks are thicker, movable only to a slight degree, the inner angle of the wrist of the chelipeds is not produced, and the abdominal segments of the ♂ are partly coalesced..

The only known species is in the "Siboga" collection represented by a whole series of specimens.

1. *Camatopsis rubida* Alcock. Pl. 16, Fig. 3.

1899. *Camatopsis rubida* Alcock et Anderson. Ann. Mag. Nat. Hist. (7), v. 3, p. 13.
1899. *Camatopsis rubida* Alcock. Deep Sea Brachyura "Investigator", p. 76, pl. 4, f. 3.
1900. *Camatopsis rubida* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 329.
1904. *Camatopsis rubida* Doflein. Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, p. 121.
1910. *Camatopsis rubida* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 344.

Stat. 5. 7° 46′ S., 114° 30′.5 E. Near north-east point of Java. Depth 330 m. 1 ♂, 1 ♀ (ovig.).
Stat. 114. Kwandang Bay entrance. Depth 75 m. 2 ♂, 1 ♀ (all juv.).
Stat. 116. West of Kwandang Bay entrance. Depth 72 m. 3 ♂ (juv.).
Stat. 254. 5° 40′ S., 132° 26′ E. W. of Kei Islands. Depth 310 m. 1 ♀.
Stat. 260. N. W. of Kei Islands. Depth 90 m. 3 ♂ (juv.).
Stat. 302. 10° 27′.9 S., 123° 28′.7 E. Near Rotti. Depth 216 m. 1 ♂ (juv).
Stat. 306. 8° 27′ S., 122° 54′.5 E. South of Flores. Depth 247 m. 2 ♂ (juv.), 1 ♀.
Stat. 312. Saleh Bay, north coast of Sumbawa. Depth 274 m. 2 ♂ (1 juv.).

The various specimens present such rather important differences one from another, that at first sight I was inclined to regard them as two distinct species; on close examination, however, I have come to the conclusion, that all the specimens belong to the same species. For the sake of convenience I shall discriminate the two forms under the names A and B, beginning with A.

All but one of the specimens "forma A" are adult (breadth of carapace more than 6.5 mm.), and all occur in deep water. The carapace is little broader than long, covered with very minute granules on the anterior parts and along the postero-lateral margins, but to a greater or lesser extent covered with a short pubescence, leaving the central parts free. In some specimens there is no trace of grooves on the carapace (fig. 2), but in others two irregular depressions mark the presence of branchio-cardiac grooves. The curvature of the surface is little pronounced, and the front is only feebly deflexed, but it presents a somewhat different shape in various individuals, even of approximately the same size. So in the two specimens of Stat. 5 (fig. 3) and in that of Stat. 254 the anterior margin of the front is perfectly straight, about as long as the eye-peduncle, whereas in others (Stat. 306, 312, fig. 3*a*) it is strongly bilobed, more roof-like and prominent over the bases of the antennules; it is this latter case, which is figured by Alcock. The eye-stalks are thick and short, for the greater part concealed in dorsal view, and on the ventral side a very minute speck of pigment may be visible, but is mostly absent. The antero-lateral margins of the carapace are much convex, sharpened, granulate, the postero-lateral ones straight, obtuse, divergent backward. The posterior margin is strongly sinuous, straight in the middle, where the narrow abdomen is attached.

Epistome present, but sunken, and ill-defined posteriorly. Basal joint of antennulae not inflated, completely filling up the small fossa, the two next joints of peduncle narrow, cylindrical, the terminal one the longer (fig. 3*a*). Antennae weak, the two last joints of the peduncle free, flagellum consisting of a few joints. Lateral margins of buccal cavity subparallel. External maxillipeds widely gaping, ischium only very little longer than merus (fig. 3*b*), the latter broader than ischium, subcircular, strongly bulging outward; palp very long and thick, with the terminal joint half as long as the preceding.

Chelipeds long and slender, longer than the carapace, and of unequal build. Meropodite

narrow, unarmed at upper border; wrist elongate, more so in the right than in the left chela; palm of right chela considerably higher and more inflated than that on the left side, with the lower finger somewhat deflexed, and fingers widely gaping at base, but meeting in their distal half, where the opposite margins are finely toothed; left chela (fig. 3*c*) low, upper margin of palm shorter than movable finger, lower finger deflexed, fingers narrowly gaping, elongate, movable finger with the inner margin irregularly cut, but without distinct teeth, fixed finger with two prominent spiniform, erect teeth in the distal half, followed by 2—3 obtuse crenulations towards the tip and preceded by a row of very minute, closely-crowded serrulations, becoming more or less obliterated with age.

Walking legs slender, middle pairs twice as long as carapace, last three joints heavily fringed, hairs especially long along hind (inner) margin of propodite and dactylus. Meropodite cylindrical, unarmed; dactyli straight, blade-like, much compressed, those of first and second pair subequal and longer than those of third pair, dactyli of last pair slender, elegantly curved backward.

First abdominal segment of ♂ (fig. 3*d*) linear, occupying about one-third of the interspace between the last pair of legs, second segment less broad, third segment much longer, projecting laterally as far as first segment, but completely fused with fourth and fifth segment, penultimate segment distinctly shorter than terminal one, which is of an oblong shape.

The general colour of the animal is of a uniform milky-white, but the pubescence is greyish-white or dusky-brown; the surface of the walking legs is thickly pubescent in some individuals, but in others entirely hairless. The carapace is sometimes covered with minute reddish dots.

The specimens of the "forma B" (fig. 3*e*) are, without exception, much smaller, the largest individual (Stat. 312) measuring only 5.4 mm. across the carapace; except this specimen all were taken from much shallower depths (70—90 metres). This form is distinguished by the following points:

1° The carapace is somewhat less pubescent; the eye-stalks are visible plainly from above; the eyes are entirely absent. In the shape of the front the same variation occurs as in the individuals of "forma A", the anterior margin being straight or faintly bilobed (fig. 3*f*).

2° Antennulae shorter, last joint of peduncle thicker (fig. 3*f*).

3° External maxillipeds rather widely different from those of "forma A" (compare figs. 3*b* and 3*g*): ischium narrower, merus of a much more slender shape, oblong, as long as ischium and not bulging outward; terminal joint of palp very short, scarcely one-third of length of preceding joint.

4° Right (larger) chela agreeing with that of "forma A", but left chela differing in having the whole inner margin of the fixed finger provided with the closely-crowded, plate-like and high serrulations, found in the proximal half of that finger in "forma A", but here generally more or less obliterated (fig. 3*h*). The opposite margin of the mobile finger is unarmed, save for a rather large, truncated tooth quite near the base; this tooth, however, is wanting in some individuals.

5° The abdomen of the ♂ (fig. 3*i*) resembles that of "forma A", but the penultimate segment is not shorter than the terminal one, which is as long as broad at the base.

These differences may easily be accounted for by the various stages of age, though it must be admitted, that a serious objection to this assumption is lying in the differences between the meri of the external maxillipeds in the two forms. Supposing for the present, that "B" is the younger stage of "A", we arrive at the conclusion that, though in all stages of age allowance is made for individual variation with regard to the shape of the front, the growing individual, which appears to show a preference to a shallower depth than his grown-up parents [1]), goes through some modifications, both in the shape of the external maxillipeds and in the armature of the fingers of the left chela. This young stage or "forma B" is also generally distinguished by a ruddy-brown colour, covering to a greater or lesser extent the under and side parts of the body and the walking legs.

At one station (Stat. 312) 2 ♂ were caught, at a depth of 274 metres, one belonging to "A", the other, much smaller one, to "B". For the rest, at all stations either "A" or "B" was obtained, i. e. "A" in much deeper water than the other form. At one station (Stat. 302) a very small specimen (breadth across carapace only 3.5 mm.) lived, at a depth of 216 metres, which presents a mixture of characters of both forms: it has the general colour and the left chela entirely like in "B" or in the young stage, but the external maxillipeds are shaped like those of "A". Leaving aside this specimen, the "forma A" was found at Stat. 5, 254, 306 and 312, the other at Stat. 114, 116, 260 and 312.

The species has been recorded from the Andaman Sea, the west coast of Sumatra and the Gulf of Siam.

Dimensions in mm.:	1 ♀	2 ♀	3 ♂	4 ♂
Breadth of carapace	11.5	8.15	4.5	3.5
Length of carapace	10.5	6.6	5.4	3.1
Length of left chela.	—	11.—	—	—
Length of second pair of walking legs .	—	13.—	—	—

N° 1 is the egg-bearing specimen of Stat. 5 (diameter of eggs 0.73 mm.), n° 2 from Stat. 254, n° 3 ("forma B") from Stat. 312, n° 4 (intermediate between forma "A" and forma "B") from Stat. 302.

Subfam. Hexapodinae.

It would seem at first sight that no subfamily among all the Brachyura could be more sharply characterized than the present one, on account of the entire lack of the fourth pair of walking legs. And yet there is some controversy among systematists with regard to the limits of the group, for species with truly three pairs of walking legs are, by means of *Amorphopus*, in which the fourth pair is represented by a minute tubercle on the coxopodites of the third pair, connected to such genera like *Pseudopinnixa*, *Tritodynamia* etc., with the fourth pair, though small and weak, distinctly developed. This fact induced Ortmann [2]), who considered

1) Miss Rathbun records a single specimen (♂) from the Gulf of Siam, taken at a depth of only 20 fathoms, but she does not give any description of this specimen. Alcock's three specimens are from deep water (194 fathoms) and all probably adult.

2) Zool. Jahrb., Syst., Bd 7, 1894, p. 690—691.

the *Hexapodinae* a subfamily of the Pinnotheridae, to a considerable widening of the present group, including even such genera as *Malacosoma* and, though doubtfully, also *Pinnotherelia* and *Asthenognathus*. Alcock, on the contrary, whose views are here followed, strictly adheres to the absence or presence of the fourth pair of walking legs, allowance being only made for *Amorphopus*. It is certainly undeniable that the existence of the *Hexapodinae* renders a sharp demarcation between Goneplacidae and Pinnotheridae somewhat vague, and that they may be referred with as much right to either of these families.

It is most likely the commensalistic mode of life of the *Hexapodinae* that has brought about not only the cylindrical shape of the body, but also the disappearance of the posterior legs, which, by the fact that they are inserted at a higher level than the preceding pairs, perhaps would rather impair the animal's moving up and down in the tubes of Annelids and Hydrozoa. In many cases, however, the crabs are found outside their hosts or in indifferent surroundings. Whether a trace of the fourth pair of walking legs still exists in the very young individuals is unknown, but a specimen of *Hexapus sexpes* with a length of only 3 mm., examined by A. Milne-Edwards, presented no vestige of degenerated posterior legs.

Key to the genera:

1. Fourth pair of ambulatory legs present in the shape of a tubercle, at the base of the coxopodites of third pair. . . . . **Amorphopus** Bell [1])
   Fourth pair of ambulatory legs completely absent. 2
2. Ambulatory legs very much elongate, slender, the meropodites of third (last) pair being $1\frac{1}{2}$ times as long as the carapace. Front narrow, much widening anteriorly; eyes very large, hammer-shaped. Deep sea species . . . . . **Hexaplax** Doflein
   Ambulatory legs thick and short 3
3. Propodus of external maxillipeds angular, broadened distally and attaining about the width of the narrow merus. . . . . **Thaumastoplax** Miers
   Propodus of external maxillipeds of normal shape, cylindrical. . 4
4. First sternal segment of ♂ with two deep, clearly-defined, transverse trenches, into which the distal part of the rectangularly-bent sexual appendages fits . . . . . **Lambdophallus** Alcock
   Trenches in the first sternal segment of ♂ ill-defined and short, situated immediately beneath buccal cavity . . . . . **Hexapus** de Haan.

Thaumastoplax Miers.

1881. *Thaumastoplax* Miers. Ann. Mag. Nat. Hist. (5), v. 8, p. 261.

Were it not for the unusual shape of the external maxillipeds, this genus would certainly be identical with *Hexapus*, but merus and ischium of these appendages are very narrow and weak,

1) Journ. Linn. Soc. London, v. 3, 1859, p. 27. The only species, *A. cylindraceus*, is, up to the present time, represented by one single specimen, the habitat of which is not stated.

whereas the palp is greatly developed, with the propodus considerably widening distally and truncate [1]).

Three species of this genus are now known, the type species is Atlantic.

Key to the species:

1. Propodus of external maxillipeds longer than wide at its distal end. Third (last) pair of walking legs as long as preceding pair. Atlantic species . . . . . *Th. anomalipes* Miers [2])

   Propodus of external maxillipeds as long as wide. Third pair of walking legs subequal to first and narrower than second pair . 2

2. Fronto-orbital distance less than one-half width of carapace. Regions of carapace not distinguishable, except for a H-shaped figure in the middle. Upper margin of meropodites of middle pair of walking legs spinulous . . . . . *Th. orientalis* Rathbun [3])

   Fronto-orbital distance equal to one-half width of carapace. Gastric, and to a lesser degree the cardiac region, are distinctly defined *Th. chuenensis* Rathbun [4])

Lambdophallus Alcock.

1900. *Lambdophallus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 329.

This genus is founded on the species *L. sexpes*, which is provided with a deep, transverse trench in the first sternal segment of the ♂; it is in this trench that the distal part of the rectangularly-bent sexual appendages is lodged. The meropodites of the walking legs are not very much broadened, anterior and posterior margin parallel. The pterygostomian regions, according at least to Alcock's figure [5]), are provided with some faint oblique striae, resembling those of *Hexapus*; the external maxillipeds, too, are much alike in both genera, but in *Lambdophallus* the last joint (dactylus) of the palp is not very much produced and as long as the propodus. This species has been dredged in the Bay of Bengal, at a depth of 65 fathoms.

A second species, *L. anfractus*, has in recent years been established by Miss Rathbun, but, as I hope to show (p. 241), it is identical with *Hexapus sexpes*. The genus will, on close examination, probably turn out to be only a subgenus of *Hexapus*.

Hexapus de Haan.

1835. *Hexapus* de Haan. Faun. Japon., Crust., p. 35.

This genus contains but a single species, which, except for his broader walking legs and the elongate dactylus of the palp of the external maxillipeds does not materially differ from *Lambdophallus*.

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1) Stebbing (Ann. S. Afr. Mus., v. 6, 1910, p. 316) throws doubt upon the exactness of Miers' figure of these maxillipeds and calls this figure "very unconvincing", but in this very year Miss Rathbun described in two new species of *Thaumastoplax* precisely the same kind of maxillipeds, and formerly Ortmann (Zool. Jahrb., Syst., Bd 7, 1894, p. 693) stated that the external maxillipeds of *Tritodynamia* are of an identical build.

2) Ann. Mag. Nat. Hist. (5), v. 8, 1881, p. 261, pl. 14, f. 2. Hab. Goree Island (Senegambia).

3) Proc. Biol. Soc. Washington, v. 22, 1909, p. 113; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 346, textfig. 33, pl. 2, f. 1. Hab. Gulf of Siam.

4) Proc. Biol. Soc. Washington, v. 22, 1909, p. 113; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 347, textfigs. 34—35. Hab. Gulf of Siam.

5) Ill. Zool. "Investigator", Crust. prt 10, 1903, pl. 62, f. 1*a*.

1. *Hexapus sexpes* (Fabricius). Pl. 17, Fig. 1.

Literature: STEBBING, Ann. S. Afr. Mus., v. 6, 1910, p. 315 [1]).

Stat. 37. Sailus Ketjil, Paternoster Islands. Depth up to 27 m. 1 ♀.
Stat. 258. Tual, Kei Islands. Depth 22 m. 2 ♂.

The descriptions and figures of A. MILNE-EDWARDS [2]), DE MAN [3]) and STEBBING [4]), especially those of the two latter authors, are so complete that a thorough description may be dispensed with. In comparing the somewhat different appearances of the animals figured we are led to the conclusion, that in young individuals (length of carapace 3 mm.) the breadth of the carapace is twice its length, the surface pubescent throughout, and the postero-lateral margins strongly divergent backward, but that with advancing age the carapace becomes proportionately narrower, the postero-lateral margins assume a subparallel course, though developing a strongly convex bulge near the posterior angles, and the pubescence is gradually lost. The number of oblique ridges on the pterygostomian regions seems to vary individually, independent of age [5]).

Miss RATHBUN [6]), in describing her *Lambdophallus anfractus*, doubts whether the specimens of DE HAAN, A. MILNE-EDWARDS and DE MAN are really identical. Besides the "Siboga" specimens I have also examined DE HAAN's original individual, which is still preserved in the Leiden Museum, and after close inspection I find them all wholly identical. Neither do I hesitate to maintain the correctness of the determinations both of MILNE-EDWARDS and of DE MAN.

The following particulars will be of some use:

1° The regions on the carapace are usually not perceptible; the postero-lateral margins exhibit, save perhaps in very small individuals, a somewhat flattened, prominent lobe near their distal ends.

2° The front is nearly vertically deflexed, about one-fifth of the width of the carapace and truncate; the eyes are globular, with normal cornea, but with the pigment brown and scanty; the eye-stalks are not firmly fixed; there is a supra-ciliary groove along the supra-orbital margin.

3° The antennulae are transverse; an epistome is distinct, and the lateral walls of the buccal cavity diverge backward. External maxillipeds gaping, the gap being for a large part filled up by the palpi; when deprived of the thick coating of hairs, merus and ischium have a characteristic shape (fig. 1*a*) and the fact that they are incorrectly represented by DE HAAN [7]) induces me to figure them anew, also in order to compare my statements with STEBBING's figure: ischium narrow, not longer than merus, with a large widening at the inner distal angle [8]); merus oblong, rounded, with the palp inserted at the tip; carpus thick and short, presenting a strong tuft of feathered hairs; propodus in STEBBING's figure longer and

1) STEBBING has overlooked ZEHNTNER's record of the species (Rev. suisse zool., t. 2, 1894, p. 159) and also that of A. MILNE-EDWARDS (see note 2).

2) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 253, pl. 12, f. 1.

3) Arch. Naturgesch., Jahrg. 53. 1., 1888, p. 322, pl. 13, f. 3.

4) L. c., p. 315, pl. 41.

5) It must be noted, however, that ZEHNTNER in a very large individual from Amboyna (length of carapace 15 mm., breadth 23.5 mm.) states the complete absence of these oblique ridges.

6) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 349.

7) Faun. Japon., Crust., 1835, pl. D.

8) Ischium, according to STEBBING's figure, longer than merus, with the lateral margins parallel over their greater part.

also broader than carpus, but this is not the case in my specimens at hand; dactylus very long, as already stated by DE HAAN, but not figured by him; exognath narrowing distally, at its base (at least in my specimens) nearly as wide as the basal part of the ischium.

4° Chelipeds unequal, the right chela being higher (height of palm nearly equalling its length) and more inflated than the left; the fingers of this chela are not so short as figured by DE HAAN [1]) and the movable finger exhibits one or two truncate teeth near the base of the inner margin.

5° Walking legs short; meropodites of second and third (last) pair twice as long as broad, widening distally, in the second pair longer than in the third, superior margin tomentose in ♂, glabrous in ♀; propodites nearly semi-circular, with the posterior margin, like that of carpopodite, long-hairy; dactyli short, thick, straight, hairy at inner margin; in the last pair STEBBING figures the dactyli as being constricted in the distal part, but I observed nothing of this kind in my specimens.

6° In the first sternal segment of the ♂ there are two broad, sinuous grooves, parting from the anterior portion of the deep trench, into which the abdomen fits, for the reception of the distal part of the long, outwardly-curving first abdominal appendages. I find these transverse grooves in the "Siboga" specimens as well as in that of DE HAAN; as they are, however, shallow and filled with hairs, they may be easily overlooked. That DE MAN has made no mention of them may possibly be explained by the gradual disappearance of the grooves in such large examples as examined by him. On account of the transverse grooves being present in *Hexapus*, the difference between this genus and *Lambdophallus* becomes only gradual, and I have no doubt that *Lambdophallus anfractus* Rathbun [2]) is wholly identical with *Hexapus sexpes*, to which species the former showed, as Miss RATHBUN herself admitted, "a suspicious resemblance"; also in many other respects (lobe-like projection of postero-lateral margins of carapace, slight mobility of eye-stalks, shape of external maxillipeds, buccal cavity, chelipeds, walking legs and abdomen) there is a complete agreement between both species.

7° The abdomen of the ♂ is very narrow as compared to the broad sternum; the two first segments (fig. 1 *b*) are very short, linear; the third, fourth and fifth segment are completely coalesced [3]) and together form a continuous plate, as broad at the base as long; the penultimate segment is subquadrate, large, longer than the terminal one; the latter is subtriangular, thickly fringed with rather long, feathered hairs, which also are implanted on the suture between this segment and the preceding. The abdomen of the ♀ is only slightly broader in the middle than that of the ♂ and all the segments are separated.

This species has been recorded from Japan, New Caledonia, Amboyna, and (though doubtfully, STEBBING) from the Cape. In the Gulf of Siam a whole series of specimens of *Lambdophallus anfractus* were obtained, but, though Miss RATHBUN records several ovigerous ♀, the dimensions of a single ♂ only, of moderate size, are given.

1) L. c., pl. 11, f. 6.
2) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 348, textfig. 36.
3) In DE HAAN's specimen, just as has been depicted by this author, these segments are not fused.

Among the specimens recorded, those of DE MAN from Amboyna are noteworthy for their large size, the length of carapace measuring nearly 13 mm., the breadth 18 mm. From the same locality ZEHNTNER records an even larger individual, which, like that of DE MAN, inhabited the tube of a large Annelid (See note 1 and 5, p. 240).

Dimensions in mm. ("Siboga" specimen):

	♂
Fronto-orbital distance	3.2
Anterior margin of front	1.55
Length of carapace	5.5
Breadth of carapace	8.4
Length of meropodite of second pair of walking legs	3.5
Breadth of meropodite of second pair of walking legs	1.75

Hexaplax Doflein.

1904. *Hexaplax* Doflein. Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, p. 122.

This remarkable deep sea genus is at first glance distinguished by the very large orbits and hammer-shaped, well-pigmented eyes, further by its slender, elongate legs. Only a single species is known.

1. *Hexaplax megalops* Doflein.

1904. *Hexaplax megalops* Doflein. L. c., p. 122, pl. 31, f. 3—4, pl. 50, f. 7 (eye).
1910. *Hexaplax* sp. Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n°4, p. 349, textfig. 37.

Stat. 12. 7° 15′ S., 115° 15′.6 E. North of Bali. Depth 289 m. 3 ♂ (1 juv.), 3 ♀ (1 juv.).
Stat. 212. 5° 54′.5 S., 120° 19′.2 E. West of Saleyer Island. Depth 462 m. 1 ♂ juv.

A description of this interesting species would, to a great extent, be nothing but repeating DOFLEIN's diagnosis. This author knew only a single ♂, and I am enabled now to state that in the ♀ the "musical ridge", consisting of a great many fine ridges placed on an elevated ribbon, into which the pleural groove on the pterygostomian regions is transformed, is quite as well developed as in the ♂. DOFLEIN compares this ridge with the "musical organ" of *Ocypoda* (in which, however, as is well known, this appliance is situated at the inner surface of the large chela and is rubbed against a crest at the ischiopodite of the limb), but to my mind it is better comparable to what is found in *Trizocarcinus* Rathbun [1]). The surface of the carapace is so finely studded with closely-arranged granules as to give it the appearance of *Ocypoda*, under a rather strong magnification. A strongly-concave cervical groove is faintly represented. The front is strongly narrowed between the eye-stalks, widening anteriorly, with the angles rounded and the anterior margin straight, but slightly notched in the middle; it is obliquely deflexed and overhangs somewhat the antennulae, which are neatly folded up transversely; the antennae reach as far laterally as the orbit. Owing to the very large, hammer-shaped eyes the orbit, which is nearly entirely developed on the dorsal side of the animal, is greatly enlarged in its distal half, so that a semi-circular notch is cut out in the supra-orbital margin. The eye-stalks are freely movable.

1) Proc. U. S. Nat. Mus., v. 47, 1914, p. 117, textfig. 1.

The buccal cavity and the external maxillipeds greatly resemble that of *Hexapus*, but the former is yet more arch-like and the surface of the latter is not hairy, but granulate; the merus, however, is not oblong, but subquadrate, though with rounded angles.

In both sexes the right chela is slightly higher and thicker than the left. Meropodite of cheliped short, with sharp granules and a row of hairs along upper and inner margin; wrist short, with the inner angle produced; upper border of palm inflected inward and sharpened, thus being able to produce a squeaking sound when being rubbed against the "musical ridge"; fingers compressed, teeth interlocking, two of them, near the base of the movable finger of the right chela, being especially large and directed obliquely-backward.

I have nothing to add to DOFLEIN's description of the ambulatory legs. As to the sternum, it is not smooth in my larger specimens, but finely granulate and punctate, like the carapace; and the segments of the abdomen of the ♂ are free only in the young state, in the larger individuals the 3rd to 5th segment are entirely coalesced. The first segment of the abdomen of both sexes is hidden under the carapace; the terminal segment in the ♂ is as long as the preceding. As to the abdominal appendages of the ♂ and the sexual openings I can only confirm DOFLEIN's statements.

The animal is of uniform ivory-white colour, without special markings.

The "Valdivia" expedition obtained a single specimen south of Nias, from a depth of 470 metres. Afterwards Miss RATHBUN records a single, very young specimen (breadth of carapace only 1.8 mm.) from the Gulf of Siam, from a depth of only 6 fathoms; on account of its damaged condition the author is doubtful about identifying it with DOFLEIN's species [1]).

Some of my specimens are larger than those of DOFLEIN.

Dimensions in mm.:

	♂	♂	♀	♀
Fronto-orbital distance	10.—	9.—	11.—	8.75
Width of anterior part of front	4.25	3.25	4.5	3.—
Width of front between eye-stalks	2.25	2.—	2.75	2.—
Length of carapace	11.5	10.—	12.5	9.75
Breadth of carapace	16.—	14.25	16.75	13.75
Length of left chela	—	8.5	9.25	8.—
Length of right chela	10.5	9.—	9.75	8.25
Length of second pair of walking legs	31.—	29.—	33.5	28.—
Length of meropodite along ant. margin of second pair of walking legs	14.5	13.—	15.—	12.5
Breadth of meropodite of second pair of walking legs	2.75	2.5	2.75	2.—
Length of carpo- + propodite along ant. margin of second pair of walking legs	10.5	9.5	11.—	9.—
Length of dactylus of second pair of walking legs	5.—	4.—	5.—	4.—
Posterior margin of carapace	12.5	11.5	13.5	10.5
Base of abdomen	3.25	3.—	4.—	3.25

1) The front in the Siamese individual, though agreeing with that of DOFLEIN's specimen, seems to be quite horizontal, not obliquely deflexed, and the external maxilliped, if correctly figured, is of an abnormal shape: the ischium is much longer than the merus and presents parallel margins, the carpus is produced hood-like over the propodus and the dactylus is not longer than the preceding segment.

PINNOTHERIDAE.

It is difficult to give a common diagnostic for this family. Easily as the characteristic representatives are recognizable, there is a gradual shading, through the subfamilies *Pinnotherelinae* and *Asthenognathinae*, to the *Hexapodinae*, which are referable to the Goneplacidae. With these *Hexapodinae* the members of the present family also share the commensalistic habits: the majority of the species, as far as the host is known, inhabit the mantle-cavity of Lamellibranchs, some are living in the cloaca of Holothurians, some in that of Echinids, and others again in the tubes of Annelids. The crabs are generally small, the carapace is often ill-calcified, membranaceous; regions are not defined; antennulae and antennae very minute; the eye-peduncles small and very short, slightly movable, the eyes generally present, though often showing signs of degeneration; the external maxillipeds of the typical representatives are peculiarly transformed: the ischium is indistinguishably fused with the merus and forms with it a broad plate, lying with its long axis nearly transverse to the long axis of the cephalothorax, and the palp is very large; in conformity with this arrangement the buccal cavity is of a semi-lunar shape and very broad behind. In other subfamilies, however, the external maxillipeds are lying parallel to each other with their long axes and of a normal shape, with ischium and merus distinct.

It is on the shape of these maxillipeds that the four subfamilies are founded.

Key to the subfamilies:

1. Ischium and merus of ext. maxillipeds distinct 2
   Ischium and merus of ext. maxillipeds fused to a single piece, which is usually placed very oblique, almost transverse; palp smaller than ischium-merus. Usually the carapace is not appreciably broader than long . . . . . Subfam. PINNOTHERINAE
2. Orbits nearly parallel to the longitudinal axis of the body, wholly visible in dorsal view . . . . . Subfam. XENOPHTHALMINAE
   Orbits in the usual position, transverse, small 3
3. Ischium of ext. maxillipeds smaller than merus; palp often very large. Carapace notably broader than long . . . . . Subfam. PINNOTHERELINAE
   Ischium of ext. maxillipeds larger than merus; palp not large. Subfam. ASTHENOGNATHINAE

Subfam. PINNOTHERINAE.

This group contains the most typical representatives and is immediately recognizable by the shape of the external maxillipeds, besides by the carapace being nearly always of a parchment-like consistence and subcircular or indistinctly angular, but without sharpened lateral margins, which never present teeth or notches.

Key to the genera:

1. Palp of ext. maxillipeds two-jointed only, the dactylus being absent 2
   Palp of ext. maxillipeds three-jointed, the dactylus being generally inserted at the inner side of the propodus . 4
2. Terminal joint of palp of ext. maxillipeds widening distally. 3
   Terminal joint of palp of ext. maxillipeds not widening distally . . . . . **Ostracotheres** H. Milne-Edwards
3. Dactyli of walking legs, except those of last pair, deeply bifurcate . . . . . **Dissodactylus** S. J. Smith
   Dactyli of walking legs simple, about as long as propodites. Orbits ventral in position. Carapace well calcified . . **Cryptophrys** Rathbun
4. Lateral margins of carapace thickened, upturned . . . 5
   Lateral margins of carapace not upturned 6
5. Middle of carapace with a prominent tubercle, shaped like a mushroom and reniform . . . . . **Xanthasia** White
   Middle of carapace with a longitudinal ridge . . . . **Dürckheimia** (Rüppell) de Man
6. Propodus of ext. maxillipeds longer than merus. Carapace well calcified . . . . . **Scleroplax** Rathbun
   Propodus of ext. maxillipeds much shorter than merus. Carapace parchment-like 7
7. Longitudinal grooves on the carapace, beginning behind the orbits . . . . . **Raphonotus** Rathbun
   No longitudinal grooves on the carapace. . . . . **Pinnotheres** Latreille

Dissodactylus S. J. Smith.

1870. *Dissodactylus* S. J. Smith. Transact. Connecticut Ac., v. 2, p. 172.
1900. *Echinophilus* Rathbun. Am. Natur., v. 34, p. 590.

The typical species is *Dissodactylus nitidus* S. J. Smith, l. c., p. 173, found at Panama. Afterwards Miss RATHBUN records it from Lower California [1]) and from Peru [2]).

A second species is *Dissodactylus mellitae* Rathbun, l. c., and a third *Dissodactylus encopei* Rathbun, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 22, textfig. 5; both these species are associated with Echinids and occur in West Indian waters.

1) Proc. U. S. Nat. Mus., v. 21, 1899, p. 609.
2) Proc. U. S. Nat. Mus., v. 38, 1910, p. 545, pl. 48, f. 6.

Cryptophrys Rathbun.

1893. *Cryptophrys* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 250.

Only one species is known, *Cryptophrys concharum* Rathbun, l. c. [1]), which inhabits the coast of Lower California and lives in the mantle-cavity of *Mya arenaria* and *Cardita*.

Xanthasia White.

Literature: Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 340—341.

The typical species is the very characteristic *Xanthasia murigera* White; its records in literature are enumerated by Alcock, l. c. Its original locality are the Philippines, but afterwards it has been recorded from the Fiji Islands, New Caledonia, Mozambique, Mergui Archipelago, Andamans, New Guinea and Australia.

A second species is *Xanthasia whitei* de Man [2]) from the Mergui Archipelago. Like the typical form it inhabits the mantle-cavity of Lamellibranchs; the lateral margins of the carapace are not thin, but thickened, they are separated from the likewise thickened posterior margin, and the tubercle in the middle of the carapace is not shaped like a mushroom and ill-defined.

Dürckheimia de Man.

1889. *Dürckheimia* (Rüppell in M.S.) de Man. Zool. Jahrb., Syst., Bd 4, p. 442.

The genus has been founded on *Dürckheimia carinipes* de Man, from the Red Sea. It presents a rounded, elevated ridge parting from the middle of the posterior margin of the carapace, but disappearing in the anterior third of the carapace. In a second species, *Dürckheimia caeca* Bürger [3]) from the Philippines, this median ridge is thinner, crest-like, and continued forward to the deep notch in the anterior margin of the carapace.

Scleroplax Rathbun.

1893. *Scleroplax* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 250.

The only species is *Scleroplax granulata* Rathbun, l. c., p. 251, from California [4]).

Raphonotus Rathbun.

1851. *Fabia* Dana. Am. Journ. Sc. (2), v. 12, p. 290 (praeocc.).
1897. *Raphonotus* Rathbun. Proc. Biol. Soc. Washington, v. 11, p. 166.

This genus again contains only a single species, *Fabia subquadrata* Dana [5]) from Oregon

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1) See also Holmes, Occas. Pap. Californ. Ac, Sc., v. 7, 1900, p. 96; Rathbun, Harriman Alaska Exp., v. 10, 1904, p. 188; Weymouth, Leland Stanford Jr. Univ. Publ., n° 4, 1910, p. 60.

2) Journ. Linn. Soc. London, v. 22, 1888, p. 106, pl. 7, f. 1.

3) Zool. Jahrb., Syst., Bd. 8, 1895, p. 385, pl. 9, f. 33, pl. 10, f. 31.

4) See also Holmes, Occas. Pap. Californ. Ac. Sc., v. 7, 1900, p. 94; Rathbun, Harriman Alaska Exp., v. 10, 1904, p. 188; Weymouth, Leland Stanford Jr. Univ. Publ., n° 4, 1910, p. 59, textfig. 8.

5) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253; U. S. Expl. Exp., Crust., 1852, p. 383, pl. 24, f. 5; Holmes, (part.), Occas. Pap. Californ. Ac. Sc., v. 7, 1900, p. 87; *Raphonotus subquadratus* Rathbun, Harriman Alaska Exp., v. 10, 1904, p. 186; Weymouth, Leland Stanford Jr. Univ. Publ., n° 4, 1910, p. 55, textfig. 2. Holmes, according to Miss Rathbun, confounded with *R. subquadratus* another apparently new species, which is called *R. lowei*. *Raphonotus* is very common in the mantle cavity of the common mussel (*Mytilus edulis*) and in the folds of *Lucapina crenulata* (a Gastropod allied to *Fissurella*).

(California). DANA also includes "*Pinnotheres*" *chilensis* H. Milne-Edwards [1]), but this has been made by HELLER the type of a new genus, *Pinnaxodes*, which is now generally considered at most a subgenus of *Pinnotheres*.

Pinnotheres [2]) Latreille.

1804. *Pinnotheres* Latreille. Hist. nat. Crust. et Ins., t. 6, p. 78.
1851. *Pinnothera* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253.
1900. *Pinnoteres* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 337.

About the diagnosis of this well known genus, see ALCOCK and MIERS [3]).

The genus *Pinnaxodes* Heller [4]) is according to BÜRGER [5]) to be merged into the present genus. HELLER founded *Pinnaxodes* on the species *P. hirtipes* which subsequent authors generally regarded as identical with *P. chilensis* H. Milne-Edwards (see note 1), though Miss RATHBUN [6]) is not quite certain about the matter, and at least maintains HELLER's genus. The only character by which *Pinnaxodes* is distinguished from *Pinnotheres* consists in the dactylus of the external maxillipeds being placed end to end with the propodus and not inserted far back on the inner side of the latter. BÜRGER, however, stated that there are gradual transitions between the two cases.

The number of species of *Pinnotheres* is enormous and is certainly much larger than that of all the other genera of the whole family taken together. The Indo-Pacific species, excluding those of the West American coast, are more than 60 in number. As all these species are small aud greatly alike, as in most instances only one of the sexes is known and the carapace itself offers little remarkable, the discrimination within the genus is very difficult and is founded on the shape of the external maxillipeds and on the relative length of the dactyli of the walking legs.

Carcinology is much indebted to BÜRGER, who in 1895 described about 30 new species of *Pinnotheres* and at the same time united them all, together with some others, known to him by autopsy, into a synoptical key. In recent times Miss RATHBUN [7]) examined a valuable collection of *Pinnotheres* from the Gulf of Siam and again added 7 new species to the list.

Little desirous as I am to increase the number of species, two or three cases have induced me to do so in dealing with the "Siboga" collection.

1) On the literature of this remarkable species, inhabiting the cloaca of *Strongylocentrotus* on the west coast of South America, see S. J. SMITH, Transact. Connecticut Ac., v. 2, 1870, p. 170. The ♂ lives at the outside of the Echinid.

2) About the controversy, raised by ALCOCK, whether in the word *Pinnotheres* and its derivations the *h* should be dropped or not, the following must in my opinion not be lost sight of. ALCOCK quotes the authority of RUMPHIUS, who already in 1705 used the orthography *Pinnoteres*. Now it is true that ARISTOTLE speaks of πινοτήρης, but also the term πινοθήρας is used by this author, and it seems to me that the latter orthography is the right one, being derived from πίννα and θηράω (to hunt). It is not certain, which animal is meant by ARISTOTLE, for according to LATREILLE his text points to some small *Squilla* or some Macrurous Decapod. Apart from such arguments it seems preferable not to cling too firmly to ARISTOTLE or even RUMPHIUS, but to return simply to authors using the regular LINNEAN nomenclature, and I see no reason to follow ALCOCK in his orthography.

3) Rep. "Challenger", Brachyura, 1886, p. 275.

4) Reise "Novara", Crust. 1865, p. 68, pl. 6, f. 2.

5) BÜRGER, Zool. Jahrb., Syst., Bd 8, 1895, p. 362.

6) Proc. U. S. Nat. Mus., v. 21, 1899, p. 607, pl. 43, f. 10—11.

7) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, nº 4, 1910, p. 330—336.

Enumeration of the Indo-Pacific species of *Pinnotheres*, excluding those from the West American coast, in alphabetical order.

P. abyssicolus Alcock et Anderson. Literature: Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 340. Hab. Travancore coast, 430 fathoms. In *Lima indica*.

P. affinis Bürger, Zool. Jahrb., Syst., Bd 8, 1895, p. 365, pl. 9, f. 2, pl. 10, f. 2 and 34; Rathbun, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 330. Hab. Philippines and Gulf of Siam. In *Pinna*.

P. alcocki Rathbun (= *P. parvulus* de Man, Bürger, Alcock, nec Stimpson); de Man, Journ. Linn. Soc. London, v. 22, 1888, p. 105; de Man, Arch. Naturgesch., Jahrg. 53. 1., 1888, p. 383; Bürger, l. c., p. 376, pl. 9, f. 18, pl. 10, f. 17; Alcock, l. c., p. 339. Hab. Mergui Arch., Padang, Noordwachter Island near Batavia, Philippines. In *Cytherea*.

P. arcophilus Bürger, l. c., p. 371, pl. 9, f. 10, pl. 10, f. 10. Hab. Philippines. In *Arca*.

P. barbatus Bürger, l. c., p. 369, pl. 9, f. 8, pl. 10, f. 8. Hab. Philippines. In *Donax*.

P. boninensis Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 141. Hab. Bonin Islands. In "small oysters".

P. borradailei Nobili (= *P. tenuipes* Borradaile nec Bürger, *P. rouxi* Paulson nec H. Milne-Edwards), Paulson, Rech. Crust. Mer Rouge, 1875, p. 70, pl. 9. f. 2; Borradaile, Faun. Geogr. Maldives etc., v. 1, 1903, p. 431, textfig. 113; Nobili, Ann. Sc. Nat. (9), t. 4, 1906, p. 306. Hab. Red Sea and Minikoi. In *Mya* (?) and *Pinna*.

P. bürgeri Rathbun, l. c., p. 331, textfig. 12. Hab. Gulf of Siam.

P. cardii Bürger, l. c., p. 367, pl. 9, f. 4—5, pl. 10, f. 4; Rathbun, l. c., p. 330, pl. 2, f. 8. Hab. Philippines and Gulf of Siam. In *Cardium unedo*.

P. coarctatus Bürger, l. c., p. 369, pl. 9, f. 7, pl. 10, f. 7. Hab. Philippines, in brackish water.

P. consors Bürger, l. c., p. 377, pl. 9, f. 20, pl. 10, f. 18. See also the present paper, p. 260 Hab. Palaos Islands. In *Circe*.

P. coutieri Nobili, Ann. Sc. Nat. (9), t. 4, 1906, p. 305, textfig. 10; Bull. Mus. Paris, t. 11, 1905, p. 409. Hab. Red Sea.

P. dofleini Lenz et Strunck, Deutsch. Südpolar Exp., Bd 15, 1914, p. 281, pl. 12, f. 17—19. Hab. Cape of Good Hope.

P. edwardsi de Man, Journ. Linn. Soc. London, v. 22, 1888, p. 103, pl. 6, f. 6—9; Alcock. Journ. As. Soc. Bengal v. 69, prt 2, 1900, p. 338. See also the present paper p. 258. Hab. Mergui Arch. In *Ostraea*.

P. exiguus Bürger, l. c., p. 377, pl. 9, f. 19, pl. 10, f. 30. Hab. Samar Island (Philippines).

P. flavus Nauck, Zeitschr. wiss. Zool., Bd 34, 1880, f. 66; de Man, Zool. Jahrb., Syst., Bd 2, 1887, p. 720; Bürger, l. c., p. 383, pl. 9, f. 29, pl. 10, f. 29 and 35. Hab. Philippines. In a Holothurian.

P. glaber Bürger, l. c., p. 379, pl. 9, f. 23, pl. 10, f. 21. Hab. Palaos Islands. In *Tapes turgida*.

P. glaberrimus Bürger, l. c., p. 366, pl. 9, f. 3, pl. 10, f. 3; Rathbun, l. c., p. 330. Hab. Philippines and Gulf of Siam. In *Arca* and *Lima divaricata*, brackish water.

P. gracilis Bürger, l. c., p. 368, pl. 9, f. 6, pl. 10, f. 6; Rathbun, l. c., p. 330. Hab. Philippines and Gulf of Siam. In *Solen*.

P. holothuriae Semper, Bürger, l. c., p. 381, pl. 9, f. 27, pl. 10, f. 26 and 36. Hab. Philippines. In cloaca of a Holothurian (*Stichopus variegatus*).

P. impressus Bürger, l. c., p. 380, pl. 9, f. 24, pl. 10, f. 23. Hab. Philippines.

P. kamensis Rathbun, l. c., p. 335, textfig. 18. Hab. Gulf of Siam.

P. kutensis Rathbun, l. c., p. 335, textfig. 19. Hab. Gulf of Siam.

P. laevis Bürger, l. c., p. 380, pl. 9, f. 25, pl. 10, f. 24. Hab. Palaos Islands. In *Coralliophaga*.

P. lanensis Rathbun, l. c., p. 332, textfig. 14. Hab. Gulf of Siam.

P. latissimus Bürger, l. c., p. 373, pl. 9, f. 13, pl. 10, f. 13. Hab. Manila.

P. latus Bürger, l. c., p. 374, pl. 9, f. 16, pl. 10, f. 15. See also the present paper, p. 259. Hab. Philippines. In *Pinna*.

P. longipes Bürger, l. c., p. 379, pl. 9, f. 31, pl. 10, f. 22. Hab. Philippines.

P. lutescens Nobili, Bull. Mus. Paris, t. 11, 1905, p. 409; Ann. Sc. Nat. (9), t. 4, 1906, p. 304. Hab. Red. Sea.

P. mactricolus Alcock, l. c., p. 339; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 62, f. 4—5. Hab. British India. In *Mactra violacea*.

P. maindroni Nobili, Bull. Mus. Paris, t. 11, 1905, p. 410; Ann. Sc. Nat. (9), t. 4, 1906, p. 306, pl. 8, f. 8, textfig. 11. Hab. Red. Sea.

P. major (Pinnaxodes major) (Ortmann), Zool. Jahrb., Syst., Bd 7, 1894, p. 697, pl. 23, f. 10. Hab. Japan.

P. margaritiferae Laurie, Rep. Pearl Oyster Fish. Ceylon, prt 5, 1906, p. 424, textfig. 10; Southwell, Ceylon Mar. Biol. Rep., v. 1, prt 5, p. 227. Hab. Gulf of Manaar (Ceylon).

P. modiolicolus Bürger, l. c., p. 370, pl. 9, f. 9, pl. 10, f. 9. Hab. Philippines. In *Modiola philippinarum*.

P. nigrans Rathbun, l. c., p. 334, textfigs. 16 and 17. Hab. Gulf of Siam.

P. novae-zealandiae Filhol, Miss. île Campbell, t. 3, prt 2, 1886, p. 407; Lenz, Zool. Jahrb., Syst., Bd. 14, 1901, p. 467, pl. 32, f. 11—14. Hab. New Zealand.

P. nudifrons Bürger, l. c., p. 378, pl. 9, f. 22, pl. 10, f. 20. Hab. Philippines.

P. obesus Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253; Dana, U. S. Expl. Exp., Crust., 1852, p. 380, pl. 24, f. 3; Miers, Ann. Mag. Nat. Hist. (5), v. 5, 1880, p. 314, pl. 14, f. 4; *P. siamensis* Rathbun, l. c., p. 336, textfig. 20. See also the present paper p. 257. Hab. Fiji Islands, Borneo and Gulf of Siam.

P. obscurus Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 141. Hab. Hongkong.

P. onychodactylus n. sp. See the present paper, p. 259. Hab. Moluccas.

P. ortmanni Bürger, l. c., p. 384, pl. 9, f. 30, pl. 10, f. 28. Hab. Philippines.

P. palaensis Bürger, l. c., p. 372, pl. 9, f. 12, pl. 10, f. 12. Hab. Palaos Islands. In *Arca scapha*, *Placuna sella* and *Byssoarca*.

P. parvulus Stimpson (nec de Man etc.), Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 699, pl. 23, f. 12; Stimpson, Smithson.

Inst., Miscell. Coll., v. 49, 1907, p. 142; RATHBUN, l. c., p. 331, pl. 2, f. 9, textfig. 13. Hab. China Sea, Japan, Gulf of Siam. In *Meroë quadrata*.

P. pectinicolus Bürger, l. c., p. 365, pl. 9, f. 1, pl. 10, f. 1; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 303. Hab. Philippines and Red Sea. In *Pecten radula*.

P. perezi Nobili, Bull. Mus. Paris, t. 11, 1905, p. 164; Bull. Scient. France et Belgique, t. 40, 1906, p. 147, pl. 5, f. 25. Hab. Persian Gulf.

P. pernicolus Bürger, l. c., p. 375, pl. 9, f. 17, pl. 10, f. 16; NOBILI, Ann. mus. civ. stor. nat. Genova (2), t. 20, 1899, p. 264; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 303. Hab. Philippines, New Guinea and Red Sea.

P. pholadis de Haan (= *P. pisoides* Ortmann), Faun. Japon., Crust., 1835, p. 63, pl. 16, f. 7; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 698, pl. 23, f. 11; ADENSAMER, Ann. Hofmus. Wien, Bd 12, 1897, p. 107. Hab. Japan.

P. pilumnoides Nobili, Bull. Mus. Paris, t. 11, 1905, p. 410; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 307, textfig. 12; LAURIE, Journ. Linn. Soc. London, v. 31, 1915, p. 466. Hab. Red Sea. In sponges and Holothurians.

P. pisum (Linné) Latreille. Literature: ADENSAMER, Ann. Hofmus. Wien, Bd 12, 1897, p. 106; BORRADAILE, Brit. Antarct. "Terra Nova" Exp., v. 3, n° 2, 1916, p. 100, textfig. 12. Hab. New Zealand.

P. placunae Hornell et Southwell, Rep. Gov. Baroda Mar. Zool. Okhamandal, prt 1, 1909, p. 99, figs. Hab. British India.

P. purpureus Alcock, l. c., p. 339; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 62, f. 6; BORRADAILE, Faun. Geogr. Maldives etc., v. 1, 1903, p. 431; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 303. Hab. Andamans, Felidu Atoll and Red Sea.

P. quadratus Rathbun, l. c., p. 333, textfig. 15. See also the present paper, p. 261. Hab. Gulf of Siam.

P. rhombifer Bürger, l. c., p. 374, pl. 9, f. 15, pl. 10, f. 14. Hab. Philippines. In *Pectunculus aurifluus*.

P. ridgewayi Southwell, Ceylon Mar. Biol. Rep., v. 1, prt 5, 1911, p. 224, figs. Hab. Ceylon.

P. rotundatus Bürger, l. c., p. 378, pl. 9, f. 21, pl. 10, f. 19. Hab. Philippines. In *Circe*.

P. rouxi H. Milne-Edwards nec Paulson, Ann. Sc. Nat. (3), t. 20, 1853, p. 218, pl. 11, f. 7. Hab. Indian Ocean.

P. schauinslandi Lenz. Zool. Jahrb., Syst., Bd 14, 1901, p. 468, pl. 32, f. 15—18. Hab. New Zealand. In *Mytilus*.

P. semperi Bürger, l. c., p. 382, pl. 9, f. 28, pl. 10, f. 27. Hab. Java. In cloaca of *Holothuria fusco-cinerea*.

P. similis Bürger, l. c., p. 373, pl. 9, f. 14. Hab. Philippines.

P. socius Lanchester, Proc. Zool. Soc. London, 1901, p. 551, pl. 33, f. 3. Hab. Penang.

P. tenuipes Bürger nec Borradaile, l. c., p. 371, pl. 9, f. 11, pl. 10, f. 11. Hab. Philippines. In a Holothurian.

P. trichopus n. sp. See the present paper, p. 256. Hab. Moluccas. In *Meleagrina*.

P. villosulus Guérin [1]). See also the present paper, p. 255. Literature: MIERS, Rep. "Challenger", Brachyura, 1886, p. 277, pl. 22, f. 2; BÜRGER, l. c., p. 366, pl. 10, f. 5. Hab. Timor, Torres Straits, Philippines. In *Meleagrina*.

P. villosissimus Doflein, Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 125, pl. 37, f. 5—6, textfig. 11. Hab. Padang. In the Holothurian *Muelleria lecanora*.

In the foregoing list 65 species are enumerated. The vast majority of these, as far as the host is known, inhabits the mantle-cavity of Lamellibranchs, but the following species are living in the cloaca or the "lung" of Holothurians.

P. flavus Nauck.
P. holothuriae Semper. In *Stichopus variegatus*.
P. pilumnoides Nobili. In *Holothuria gallensis* (also in sponges).
P. semperi Burger. In *Holothuria fusco-cinerea*.
P. tenuipes Bürger.
P. villosissimus Doflein. In *Muelleria lecanora*.

One species, *P. dofleini* Lenz et Strunck, is found in an Ascidian, *Phallusia canaliculata*.

The external maxillipeds of these species, in the majority of cases, deviate from the common type in *Pinnotheres*, inasmuch as the dactylus is spoon-like, not styliform.

In preparing a key to the species BÜRGER's synopsis has proved to be of much use. The following species I have not included:

P. boninensis Stimpson, on account of the imperfectness of the description.
P. placunae Hornell et Southwell, } the descriptions of which are inaccessible to me.
P. ridgewayi Southwell, }

Furthermore I have omitted the New Zealandian species:

P. pisum (Linné),
P. novae-zelandiae Filhol,
P. schauinslandi Lenz.

Key to the species:

1. Dactylus of ext. maxillipeds inserted at inner margin of propodus. 2
   Dactylus of ext. maxillipeds placed nearly at end of propodus and reaching much farther 53
2. Dactylus styliform. 3
   Dactylus spoon-like, widening distally. Mostly in Holothurians . 46
3. Dactyli of all the walking legs subequal in length. 4
   Dactyli of the walking legs unequal in length 17
4. Dactylus of ext. maxillipeds overreaching propodus 5
   Dactylus of ext. maxillipeds not overreaching propodus . . . 7

1) This species is referred to by H. MILNE-EDWARDS and BÜRGER under the name *villosus*. I could not consult Guérin's original description in Voy. "Coquille", t. 2, 1830, p. 13, but in his subsequent work (Iconogr. Règne An., Crust. p. 7, pl 4, f. 4) the species is named *villosulus*, which term is used by MIERS.

5.	Carapace quadrangular	*P. pectinicolus*
	Carapace subcircular	6
6.	Dactylus of ext. maxillipeds considerably overreaching propodus. Chelipeds and legs nearly hairless.	*P. affinis*
	Dactylus of ext. maxillipeds not much overreaching propodus. Chelipeds and legs hairy. Species from Japan	*P. pholadis* [1])
7.	Dactylus of ext. maxillipeds by far not reaching to end of propodus	8
	Dactylus of ext. maxillipeds reaching to end of propodus	15
8.	Carapace pubescent. Propodus of ext. maxillipeds not longer than carpus	*P. villosulus*
	Carapace glabrous	9
9.	Walking legs hairy.	10
	Walking legs naked	11
10.	Carapace subcircular, vaulted. Walking legs rather robust.	*P. mactricolus*
	Carapace angular, with a prominent lobe in the middle of the lateral margin.	*P. trichopus*
11.	Dactylus of ext. maxillipeds not one- fourth of length of propodus	*P. rouxi*
	Dactylus of ext. maxillipeds longer than one- fourth of length of propodus	12
12.	Inner (posterior) margin of merus-ischium of ext. maxillipeds strongly concave.	13
	Inner (posterior) margin of merus-ischium of ext. maxillipeds straight.	14
13.	Propodus of ext. maxillipeds very long and narrow	*P. kamensis*
	Propodus of ext. maxillipeds shorter and broader.	*P. glaberrimus*
14.	Merus-ischium of ext. maxillipeds broad, length about $1^1/_2$ times its length	*P. cardii*
	Merus-ischium of ext. maxillipeds longer, length more than twice its breadth.	*P. socius*
15.	Carapace large, globular, with some large pits, tomentose, branchio-cardiac grooves distinct Propodus of ext. maxillipeds flattened and broad.	*P. edwardsi*
	Carapace small, without distinct markings. Propodus of ext. maxillipeds decreasing in breadth distally.	16
16.	Propodus of ext. maxillipeds nearly as long as carpus	*P. kutensis*
	Propodus of ext. maxillipeds longer than carpus	*P. obesus*
17.	Dactyli of 2^d pair of walking legs the longest.	18
	Dactyli of 2^d pair of walking legs not longer than those of 1st and 3^d pair	19

1) According to ADENSAMER *P. pisoides* Ortmann is identical with DE HAAN's species. Unfortunately not a single one of the more than twenty specimens examined by DE HAAN is now extant in the Leiden Museum.

18. Merus-ischium of ext. maxillipeds broad, length about $1^1/_2$ times its breadth. Dactyli of walking legs rather long. Eyes unpigmented *P. bürgeri*
Merus-ischium of ext. maxillipeds slender, more than twice as long as broad. Dactyli of walking legs very short, under margin of meropodites hairy. Eyes pigmented . . . . . *P. gracilis*
19. Dactyli of 3d pair of walking legs longer than those of 2d and 4th pair, which are subequal 20
Dactyli of 3d pair of walking legs not longer than those of 2d and 4th pair 21
20. 1st pair of walking legs the longest, the succeeding pairs decreasing gradually in length . . . . . *P. perezi*
3d pair of walking legs the longest . . . . . *P. purpureus*
21. Dactyli of 4th pair of walking legs longer than the preceding, which are subequal 22
Dactyli of 3d and 4th pair of walking legs longer than those of 1st and 2d pair, which are subequal 30
22. Dactylus of ext. maxillipeds overreaching propodus 23
Dactylus of ext. maxillipeds not reaching farther than propodus. 24
23. Carapace quadrangular. Propodites of walking legs elongate, dactyli very short, but those of 4th pair twice as long as those of preceding pair. . . . . *P. coarctatus*
Carapace narrowed anteriorly, with lateral margins much divergent backward. Propodites of walking legs shorter, somewhat hairy, dactyli strongly hooked, hairy, those of 4th pair much more slender and slightly longer than those of 3d pair *P. onychodactylus*
24. Dactylus of ext. maxillipeds reaching as far as propodus . . 25
Dactylus of ext. maxillipeds not reaching to end of propodus. 26
25. Chelipeds and walking legs hairy at inner margin; middle pairs of walking legs about equal in length to breadth of carapace. *P. tenuipes*
Chelipeds and walking legs much less hairy; the latter slender, elongate, middle pairs about $1^1/_2$ times the breadth of carapace *P. borradailei*
26. Chelipeds and walking legs thickly hairy at inner margin . . *P. barbatus*
Chelipeds and walking legs glabrous 27
27. Dactylus of ext. maxillipeds by far not reaching to end of propodus. 28
Dactylus of ext. maxillipeds nearly reaching to end of propodus. 29
28. Dactyli of 4th pair of walking legs twice as long as those of preceding pair. . . . . *P. arcophilus*
Dactyli of 4th pair of walking legs $1^1/_2$ times as long as those of preceding pair. . . . . *P. margaritiferae*
29. Palm of chela twice as long as fingers. Dactyli of 3d pair of walking legs longer than those of 2d pair . . . . . *P. modiolicolus*

	Palm of chela very slightly longer than fingers. Dactyli of 3d pair of walking legs as long as those of preceding pair.	*P. coutieri*
30.	Carapace nearly $1^1/_3$ times as broad as long	31
	Carapace at most $1^1/_5$ times as broad as long.	37
31.	Dactylus of ext. maxillipeds not reaching to end of propodus.	32
	Dactylus of ext. maxillipeds reaching to end of propodus . .	34
32.	Antero-internal angle of ext. maxillipeds pronounced. . . .	33
	Antero-internal angle of merus of ext. maxillipeds obsolete. Dactyli of 3d and 4th pair of walking legs 3 times as long as those of 2d pair	*P. latissimus*
33.	Carapace very much vaulted. Propodus of ext. maxillipeds narrowed distally	*P. nigrans*
	Carapace flattened. Propodus of ext. maxillipeds not narrowed distally	*P. lutescens*
34.	Dactyli of 3d pair of walking legs very long, 3 times as long as those of preceding pair	*P. pernicolus*
	Dactyli of 3d pair of walking legs somewhat longer than those of 2d pair, but shorter than those of 4th pair	35
35.	Posterior margin of carapace very much concave in the middle.	*P. maindroni*
	Posterior margin of carapace almost straight	36
36.	Dactylus of ext. maxillipeds reaching beyond propodus. . .	*P. obscurus*
	Dactylus of ext. maxillipeds not overreaching propodus. . .	*P. latus*
37.	Dactylus of ext. maxillipeds not overreaching propodus. . .	38
	Dactylus of ext. maxillipeds reaching farther than propodus .	45
38.	Dactylus of ext. maxillipeds reaching to end of propodus . .	39
	Dactylus of ext. maxillipeds not reaching to end of propodus.	41
39.	Dactyli of 3d and 4th pair of walking legs subequal in length	40
	Dactyli of 4th pair of walking legs twice as long as those of preceding pair.	*P. exiguus*
40.	Dactyli of 3d and 4th pair exactly equal in length	*P. consors*
	Dactyli of 4th pair somewhat longer than these of preceding pair	*P. parvulus*
41.	4th pair of walking legs longer than 3d pair	*P. rhombifer*
	4th pair of walking legs shorter than, or as long as, 3d pair .	42
42.	Dactyli of 3d and 4th pair of walking legs subequal in length	43
	Dactyli of 4th pair of walking legs longer than those of 3d pair	*P. similis* and *P. alcocki*[1])
43.	Dactyli of 3d and 4th pair of walking legs about 3 times as long as those of 2d pair	*P. palaensis*
	Dactyli of 3d and 4th pair of walking legs about twice as long as those of 2d pair	44

1) BÜRGER discriminates these species by the front being more or less prominent, more so in *P. alcocki* (identified by this author as *P. parvulus*).

44.	Propodus of ext. maxillipeds reaching to antero-internal angle of merus	*P. lanensis*
	Propodus of ext. maxillipeds reaching farther than antero-internal angle of merus, spathulate.	*P. quadratus*
45.	3^{d} pair of walking legs distinctly longer than 2^{d} pair, its dactyli subequal in length to preceding propodites	*P. rotundatus*
	3^{d} pair of walking legs not longer than 2^{d} pair, its dactyli about half as long as preceding propodites	*P. nudifrons*
46.	Dactyli of walking legs subequal	47
	Dactyli of 4th pair of walking legs the longest.	52
47.	Chelipeds and walking legs very much hairy	48
	Chelipeds and walking legs not much hairy. Species from the Cape region	*P. doflein*i [1])
48.	Dactylus of ext. maxillipeds as broad as propodus	49
	Dactylus of ext. maxillipeds narrower than propodus.	50
49.	Carapace as broad as long	*P. semperi*
	Carapace broader than long.	*P. flavus*
50.	Dactylus of ext. maxillipeds not reaching to end of propodus	*P. pilumnoides*
	Dactylus of ext. maxillipeds reaching to end of propodus	51
51.	Chelipeds and walking legs covered with very long and thick, feathered hairs	*P. villosissimus*
	Chelipeds and walking legs covered with a short toment. Species from Japan.	*P. major*
52.	Dactylus of ext. maxillipeds not reaching to end of propodus	*P. holothuriae*
	Dactyli of ext. maxillipeds reaching to end of propodus	*P. ortmanni*
53.	Dactyli of walking legs subequal in length	54
	Dactyli of walking legs unequal	56
54.	Dactylus of ext. maxillipeds nearly as long as propodus	55
	Dactylus of ext. maxillipeds very small, much shorter than propodus	*P. laevis*
55.	1st and 4th pair of walking legs subequal in length	*P. glaber*
	4th pair of walking legs much shorter than 1st pair	*P. impressus*
56.	Dactyli of 2^{d} pair of walking legs the longest.	*P. longipes*
	Dactyli of 2^{d} and 3^{d} pair the longest. Deep sea species	*P. abyssicolus*

1. *Pinnotheres villosulus* Guérin.

Stat. 261. Elat, Great Kei Island. Depth 27 m. 1 ♀ juv., in *Meleagrina*.

The whole animal is clothed with a thick woolly toment, only the fingers of the chela

1) According to STRUNCK this species, which has been found within an Ascidian (*Phallusia canaliculata*), should be most likely conspecific with *P.* sp. Doflein (Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 124, pl. 37, f. 3—4, textfig. 10) from Algoa, east of Port Elisabeth.

are free from these hairs. The carapace, when denuded, is flattened, slightly calcified, but flexible, and of a more angular appearance than depicted by MIERS; it wholly resembles that of *P. trichopus* (Pl. 11, Fig. 6), except that the front is less advanced and much deflexed, the lateral margins present a strong outward bulge in the middle and are much convergent backward behind this bulge; even the various pits and faint grooves are wholly arranged in the same way as in *P. trichopus*.

The external maxillipeds entirely correspond with the figures of H. MILNE-EDWARDS and BÜRGER: the antero-internal angle of the merus is obsolete, the propodus (which is best depicted by BÜRGER) is scarcely longer than the carpus, and the dactylus is very minute, by far not reaching to the end of the propodus. As BÜRGER rightly remarks MIERS' figure of the external maxillipeds is inexact, especially as regards the propodus.

The basal tooth at the inner margin of the movable finger fits into a notch, which is bordered by two crenulate prominences, at the opposite margin of the fixed finger.

The dactyli of the walking legs are acuminate and hooked; they are subequal in length, but yet they very slightly increase from the 1st to the 4th pair.

The species was already stated by BÜRGER to inhabit the pearl-oyster.

Dimensions in mm.:

Length of carapace . . .	5.2
Breadth of carapace . . .	5.7

2. *Pinnotheres trichopus* n. sp. Pl. 17, Fig. 6.

Stat. 261. Great Kei Island. Depth 27 m. 1 ♂, in *Meleagrina*.

Found associated with the young ♀ of the preceding species, the present example shows the greatest affinity to *P. villosulus*, and I should certainly declare it to be the ♂ of this species, were it not for a few differences, which perhaps are not sexual. The carapace is perfectly alike in its shape to that of *P. villosulus*, the angular course of the lateral margins being particularly pronounced; the front is prominent, though in front view exactly agreeing with that of *P. villosulus*, as depicted by MIERS. Instead of the uniform woolly clothing found in the preceding species, the carapace is wholly glabrous, flattened, rather hard.

The external maxillipeds in their minute dactylus (fig. 6*a*) also resemble those of *P. villosulus*, but the propodus is distinctly longer than the carpus.

The chelipeds are provided with some patches of hairs. Palm of chela (fig. 6*b*) scarcely longer than fingers, upper border hairy; back of dactylus near the base with a tuft of hairs, placed in a shallow depression, tooth at cutting margin strong, obliquely-directed backward and fitting into a notch at the opposite margin, which is bordered by two teeth, the basal one of which is large and strong, the distal one represented by a convex and crenulate bulging of the margin of the fixed finger.

The walking legs are short and again resemble those of *P. villosulus*, but their surface is naked and long, feathered hairs are inserted along the margins only. The propodites are not elongate and all the dactyli subequal.

The abdomen is long and narrow; the first segment is concealed under the carapace, the third and the fifth segment are the longest.

Dimensions in mm.:

Fronto-orbital distance . .	3.3
Length of carapace . . .	6.4
Breadth of carapace . . .	6.4

3. *Pinnotheres obesus* Dana. Pl. 17, Fig. 3.

Stat. 174. Waru Bay, north coast of Ceram. Depth 18 m. 1 ♂. In *Arca*.

Of such small individuals as are generally met with among *Pinnotheres*, lacking any dentation or special markings on the carapace and subject to variations in the outline of the latter, the identification is often troublesome. Yet the present example so much resembles DANA's figure of *P. obesus* as to render its identification with this species very likely. The carapace is subcircular, narrowed anteriorly, the front advanced, bilobed, the antennae rather long, (but this is for the most part due to the fact that the last joint of the flagellum, which consists, as usual, of only two segments, is provided with some long hairs at the tip, among which hairs some mud or detritus is retained). The external maxillipeds, too, agree with those of DANA's species in the pronounced antero-internal angle of the merus, in the elongate and slender propodus, and in the dactylus, but whereas in DANA's figure this dactylus does not quite reach the end of the propodus, it does so exactly in my specimen (fig. 3*a*); in its description DANA does not state anything about this dactylus [1]), but MIERS' specimen agrees in this respect with mine.

The chelae are greatly swollen, palm longer than fingers, movable finger with an obliquely-directed tooth near base of cutting margin, fitting into a notch at the opposite margin; DANA depicts two very minute teeth on the movable finger.

Walking legs rather robust, much more so than in DANA's figure, the last pair by far the shortest and weakest, all dactyli subequal in length, falciform, but those of the last pair are somewhat more slender, less curved, and with some few hairs along inner margin; there are also some hairs along the posterior margin of these legs.

The abdomen is rather narrow, bottle-shaped, regularly tapering; first segment shortest, second segment twice as long, all following segments longer and of subequal length.

If my specimen is really identical with *P. obesus*, there is no serious objection to unite *P. siamensis* Rathbun with it. In some respects (external maxillipeds, shape of walking legs) the present specimen even agrees better with the latter species, though the antennae are very much longer and the flagellum is represented as consisting of 3—4 long joints. The shape of

1) DANA's original description not being accessible to me, Dr. DE MAN has had the kindness to transcribe it for me.

It must be stated here that A. MILNE-EDWARDS (Nouv. Arch. Mus. Paris, t. 9, 1873, p. 318) declared *Pinnotheres globosus* Jacquinot et Lucas to be identical with DANA's species, after comparing original specimens of both these species with individuals from New Caledonia. With all respect due to the memory of the able French carcinologist I cannot decide to follow him, though the dactylus of the external maxillipeds in *P. globosus* (see H. MILNE-EDWARDS, Ann. Sc. Nat. (3), t. 20, 1853, p. 11, f. 6) does not quite reach the end of the propodus, just like in my specimen.

the abdomen of the ♂ is different, but, as the author remarks, this abdomen was rumpled in the specimen figured.

According to DANA the ♀ of the species differs by the carapace being a good deal broader than long; in the ♂ length and breadth are nearly equal.

P. obesus came from the Fiji Islands and Borneo; *P. siamensis* originates from the Gulf of Siam.

Dimensions in mm.:

Fronto-orbital distance		1.48
Length of carapace		3.—
Breadth of carapace		3.08
Length	of meropodite of 3d pair of walking legs	1.03
Breadth		0.24
Length	of meropodite of 4th pair of walking legs	0.56
Breadth		0.14

4. *Pinnotheres edwardsi* de Man.

Stat. 258. Tual, Kei Islands. Depth 22 m. 3 ♀.

Three large individuals, without eggs, and the host of which is unknown, were taken. They so closely resemble the figure of DE MAN that I cannot doubt their identity with *P. edwardsi*.

The carapace is subcircular, hard, little flexible, with the middle parts somewhat elevated and free from hairs; towards the margins the surface is concealed by a dense down of soft and thick hairs. After removal of these hairs several larger and smaller depressions, regularly arranged, are disclosed; it is in these depressions that a particular kind of very short and fine hairs, differing from the ordinary downy hairs, is retained. The carapace is moderately vaulted, most so in the anterior part, where it passes gradually into the deflexed front, the triangular middle portion of which is even curved backward; the surface of the front is divided by a faint median sulcus. The eyes are small, but quite distinct.

The external maxillipeds agree with DE MAN's description and figure, but the latter seems to have been taken from the object when in place: *in situ* the dactylus presents itself as a very narrow and slender rod, reaching exactly to the level of the obliquely-truncate distal margin of the propodus, but when the external maxilliped is severed from the body and examined separately the dactylus turns out to be flattened and somewhat curved towards the propodus.

Chelipeds [1]) and walking legs are short and covered with the two kinds of hairs observed on the cephalothorax: thick, dense, soft hairs, which are easily detached and, beneath these, very short, slender hairs, much more firmly implanted. Walking legs short, dactyli subequal, all terminating into a fine, curved point.

The only specimen hitherto known was taken from an *Ostrea* in the Mergui Archipelago.

Dimensions in mm.:

Length of carapace	18.5
Breadth of carapace	18.5

1) ALCOCK says that the fingers of the chela are unarmed, but in my specimens the usual, though low, tooth near the base of the dactylus is distinctly seen.

5. *Pinnotheres onychodactylus* n. sp. Pl. 17, Fig. 5.

Stat. 172. Between Gisser and Ceram Laut. Depth 18 m. On reef. 3 ♀ (ovig.).

This species much resembles *P. rhombifer* Bürger, which, perhaps, is nothing but *P. palaensis* Bürger, from which *P. rhombifer* is only distinguished by having the penultimate pair of legs shorter than the last pair. In the "Siboga" specimens the carapace, the breadth of which is $1^1/_3$ times its length, agrees with those of the two named species of BÜRGER; it is very much vaulted, with bulging hepatic and branchial regions, without sculpture, completely naked and very thin. The front is thickened, not prominent, and the eyes are not visible from above.

The merus-ischium of the external maxillipeds is very broad, its outer (anterior) border much curved, and the inner border straight, passing with a distinct angle into the distal margin, along which long hairs are implanted. The carpus (fig. 5*a*) is short, the propodus is much longer, its breadth at the insertion of the dactylus is $2^1/_2$ times its length, the dactylus is narrow, styliform, reaching very little beyond the rounded distal end of the propodus. The palm of the chela is inflated, about $1^1/_2$ times as long as the fingers; the latter are thick, curved towards the tip, the fixed finger is hairy beneath and the dactylus has the usual tooth, which is very small in this species, near the base of the inner margin.

The walking legs are slender and elongate, 2^d and 3^d pair are the longest, twice the length of the carapace, but the 2^d pair is slightly thicker, the 4th pair is somewhat more than half the length of the preceding pair and much more slender. The distal end of the sabre-shaped and elongate propodites, as well as the dactyli, are provided with a few silky hairs. The dactyli of the first three pairs (fig. 5*b*) are two-thirds the length of the propodite, much flattened, broadest in the middle, where they nearly attain the breadth of the preceding joint, ending in a fine, curved tip; the inner margin of the dactylus is straight, the outer convex; in the fourth pair (fig. 5*c*) the dactyli are very slender, not flattened, longer than the preceding propodites and also distinctly longer than those of the third pair, which latter are subequal to those of the preceding pairs. This character brings the species nearer to *P. coarctatus* Bürger, *P. tenuipes* Bürger, *P. borradailei* Nobili etc.; it is especially to the latter species (= *P. tenuipes* Borradaile nec Bürger) that it bears a great resemblance, but in BORRADAILE's species the length of the carapace is nearly equal to its breadth, the dactyli of the walking legs are apparently less broadened and the dactylus of the external maxillipeds reaches exactly to the end of the propodus.

The eggs are very numerous and small, measuring 0.285 mm. in diameter.

Dimensions in mm.:

Length of carapace	6.8
Breadth of carapace	8.8
Length of 3^d pair of walking legs .	11.55
Length of 4th pair of walking legs.	6.35

6. *Pinnotheres latus* Bürger.

Stat. 53. Nangamessi Bay, Sumba. Depth up to 36 m. 1 ♀ juv.
Stat. 231. Ambon. Depth 40 m. 1 ♀ ovig.

Like the foregoing the present species is broader than long, the breadth of the carapace being 1.3 times its length, according to BÜRGER's measurements, and even 1.45 times the length in my specimen. BÜRGER observed that the front is rounded and little prominent; indeed I stated that its anterior margin is regularly convex and does not present the triangular lobe, curved backward, commonly met with in *Pinnotheres*. The whole carapace is perfectly glabrous, shining, very thin and flexible; its posterior margin is quite straight.

The dactylus of the external maxillipeds reaches exactly to the end of the propodus.

The walking legs are hairless and thinner than in the preceding species; save for the dactyli, all legs are of nearly equal length. The dactyli are not flattened and slightly curved; those of the 1st and 2d pair are of equal length, about one-third the length of the preceding propodites, those of the 3d pair are of similar shape, but twice as long as in the preceding pairs, in the last pair the dactyli are more slender, hairy along inner margin and 3 times as long as those of 2d and 1st pair [1]).

The eggs of the ovigerous ♀ are most numerous and of the same diameter as in the preceding species.

Dimensions in mm.:

Fronto-orbital distance.		1.43	—
Length of carapace		3.75	8.7
Breadth of carapace		5.5	12.75
Length of dactylus	of 1st and 2d pair of walking legs	0.38	—
	of 3d pair of walking legs. . .	0.77	—
	of 4th pair of walking legs . .	1.1	—

7. *Pinnotheres consors* Bürger. Pl. 17, Fig. 4.

Stat. 277. Dammer Island, N. E. of Timor. Depth 40 m. 1 ♀. In *Arca*.

I am not quite certain about my determination, as BÜRGER's figure does not quite agree with mine. In the original specimen the carapace is more distinctly hexagonal and the eyes are not visible in dorsal view; in my specimen the carapace is more narrowed anteriorly, the anterior angles of the carapace being nearer to one another and very distinct, and the rounded eyes are shining through the supra-orbital margin. As to the chelae, BÜRGER says that the palm is scarcely twice as long as the fingers, though it does not seem so in his figure; in my specimen the palm is about $1^1/_2$ times as long as the fingers (fig. 4*b*) and the latter are each provided with a distinct, oblique tooth, that of the fixed finger being placed nearer to the tip than its antagonist. Some disagreement also exists in the external maxillipeds, the propodus of which is narrowed distally in BÜRGER's figure, but not so in my specimen (fig. 4*a*). BÜRGER does not say much about the walking legs; from his figure we learn that the dactyli of 3d and 4th pair are equal in length and longer than those of the preceding pairs. In my specimen the first three pairs of legs are subequal in length, and the last pair much shorter and weaker; the propodites are hairless; dactyli of 1st and 2d pair short, strongly hooked, hairless and perfectly alike; these of 3d and 4th pair are much more slender, regularly curved, twice as

1) BÜRGER's measurements indicate, however, that the dactyli of the 4th pair are not yet twice as long as those of the 2d pair.

long as those of preceding pairs, in the 3d pair the dactyli are provided with very short, microscopical hairs, curved backward, in the 4th pair with longer hairs, directed towards the tip. It is also remarkable that the first two pairs of walking legs of my specimen are more robust and their meropodites are longer than in the much weaker following pairs.

Dimensions in mm.:

Fronto-orbital distance		1.43
Length of carapace		3.95
Breadth of carapace		4.5
Length of dactyli	of 1st and 2d pair of walking legs	0.45
	of 3d and 4th pair of walking legs	0.9

8. *Pinnotheres quadratus* Rathbun. Pl. 17, Fig. 2.

Stat. 34. Labuan Pandan, east coast of Lombok. Depth 18 m. 1 ♂. In *Arca*.
Stat. 152. Wunoh Bay, north-west coast of Waigeu Island. Depth 32 m. 1 ♀ ovig. In *Arca*.

This species is certainly closely related to the preceding, as regards the shape of the carapace and the relative length of the dactyli of the walking legs, but differs by the dactylus of the external maxillipeds being very minute. The carapace is subcircular, but the anterior angles are pronounced; as usual, the carapace of the ♀ is more vaulted, the front less prominent and the chelae are less inflated than is the case in the ♂. In the former sex there is a triangular depression on the cardiac region, which depression is not observed in the ♂, but here the whole surface is covered with an elegant reticulation of pigment. Length and breadth of carapace are subequal and its posterior margin is regularly convex in the ♂, but concave in the ♀.

The merus-ischium of the external maxillipeds is a broad plate, with the inner (posterior) margin slightly concave and the antero-internal angle pronounced; the propodus is elongate and broad, reaching beyond the antero-internal angle of the merus, as in Miss RATHBUN's specimen; the dactylus is very minute and (in the ♂) does not even reach to the antero-internal angle of the merus, as it does in the ♀.

The 3d pair of walking legs is slightly the longest, and the 4th the smallest (Miss RATHBUN, however, states that the last pair is longer than the 2d and 1st pair); propodites hairless, dactyli of first two pairs equal in length, strongly hooked, those of 3d and 4th pair about twice as long, hairy and slender, regularly curved.

The abdomen of the ♂ seems to be broader than is the usual case in the genus, so that the breadth at the base of the terminal segment distinctly surpasses its length.

This very small species is recorded by Miss RATHBUN from the Gulf of Siam.

Dimensions in mm.:

		♂	♀
Fronto-orbital distance		1.15	1.1
Length of carapace		2.4	2.85
Breadth of carapace		2.75	3.2
Length of dactyli	of 1st and 2d pair of walking legs	0.22	0.38
	of 3d and 4th pair of walking legs	0.45	0.75

Ostracotheres H. Milne-Edwards.

1853. *Ostracotheres* H. Milne-Edwards. Ann. Sc. Nat. (3), t. 20, p. 219.
1906. *Ostracoteres* Nobili. Ann. Sc. Nat. (9), t. 4, p. 299.

The only difference between this genus and the preceding consists in the complete absence of the dactylus of the external maxillipeds.

MILNE-EDWARDS enumerated 3 species, 2 of which are now considered identical. Only in recent years NOBILI added 2 new species. Except a single record from Mauritius all specimens came from the Red Sea.

BAKER in 1908 described two new species of "*Pinnotheres*" from the South Australian coast, *P. holothuriensis* [1]) and *P. subglobosa* [2]), which species certainly do not belong to *Pinnotheres*, as the dactylus of the external maxillipeds is entirely absent. As the propodus of these maxillipeds is much widened distally, especially in *P. holothuriensis*, there is perhaps a greater affinity to *Cryptophrys* than to *Ostracotheres*, though the distal margin of this propodus is not obliquely-truncate, but rounded, as in the latter genus.

There is yet another species of *Ostracotheres*, which lives on the west coast of South America, viz. *O. politus* S. J. Smith [3]), which much resembles *O. cynthiae* Nobili by the dactyli of the last pair of legs being longer than those of the preceding pairs, but differs by the carapace being distinctly broader than long, by the last pair of legs being much more slender than the preceding pairs, and also by its habits, *O. cynthiae* living in Ascidians, *O. politus* in Lamellibranchs.

Leaving for the present the Australian and West American species aside we may discriminate the species of *Ostracotheres* by means of the following key:

1. Dactyli of walking legs all of subequal length. . . . 2
   Dactyli of walking legs unequal, those of last pair slightly the longest, nearly straight. Carapace as broad as long, in ♂ subcircular, in ♀ quadrangular . . . . . *O. cynthiae* Nobili
2. Breadth of carapace $1^1/_3$ times its length. Propodus of ext. maxillipeds not longer than carpus . . . . . *O. affinis* H. Milne-Edwards [4])
   Breadth of carapace scarcely exceeding its length . . 3
3. Carapace quadrangular. Front and ext. maxillipeds glabrous. Fingers of chelae hollowed at tip . . . . . *O. spondyli* Nobili [5])
   Carapace subcircular. Front pubescent, as are also the ext. maxillipeds on their outer surface. Fingers of chelae acute *O. tridacnae* (Rüppell) = *O. savignyi* (H. Milne-Edwards [6])

1) Transact. Roy. Soc. South Australia, Adelaide, v. 31, p. 177, pl. 23, f. 3.
2) L. c., p. 179.
3) Transact. Connecticut Ac., v. 2, 1870, p. 169; LENZ, Zool. Jahrb., Syst., Supplementbd 5, 1902, p. 765, pl. 23, f. 9; RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 545, pl. 43, f. 3. Hab. coasts of Peru and Chile.
4) Ann. Sc. Nat. (3), t. 20, 1853, p. 220, pl. 11, f. 11; NOBILI, Ann. Sc. Nat. (9) t. 4, 1906, p. 300. Hab. Mauritius and Red Sea.
5) Bull. Mus. Paris, t. 11, 1905, p. 164. Hab. Persian Gulf.
6) Literature: NOBILI, Ann. Sc. Nat. (9), t. 4, 1906. p. 299; STEBBING, Ann. S. A. Museum, v. 6, 1910, p. 331; LENZ et STRUNCK, Deutsch. Südpolar-Exp. 1901—1903, Bd 15, 1914, p. 283. It is remarkable that this rather common species of the Red Sea is recorded by KRAUSS from Natal and by STRUNCK from Simons Bay (Cape Region). The Leiden Museum contains two specimens (♂ and ♀) collected by Mr. J. A. KRUYT in 1881 at Djeddah.

1. *Ostracotheres cynthiae* Nobili.

1906. *Ostracoteres cynthiae* Nobili. Ann. Sc. Nat. (9), t. 4, p. 301, textfig. 9.
1915. *Ostracotheres cynthiae* Laurie. Journ. Linn. Soc. London, v. 31; p. 465, pl. 45, f. 3.

Stat. 258. Tual, Kei Islands. Depth 22 m. 1 ♀ ovig., in *Styela pneumonodes*.

As has been observed by Nobili the carapace of the ♀ is somewhat quadrangular; that of the ♂, which is described by Laurie, is much more subcircular. It is nearly straight in transverse direction, and also longitudinally, but the anterior third part is strongly curved downward; a fine toment is found everywhere on the carapace; its lateral margins are distinct and convergent backward and the posterior margin is straight. Regions are not discernible.

In front view of the animal the front is seen to be continued by a triangular septum, directed backward, between the almost transversely-folded antennulae. The eyes are very small, though quite distinct, and concealed beneath the short toment, that covers also the epistome, the epibranchial, subhepatic and subbranchial regions. The antennae are so extremely minute that they scarcely reach beyond the small, circular orbit; the antennulae are much stouter, the outer flagellum is very short and provided with a tuft of long olfactory hairs, the inner flagellum much longer, slender, cylindrical. The external maxillipeds are covered with the usual, short, feathered hairs, among which generally mud is retained; it agrees better with Laurie's figure than with that of Nobili, inasmuch as the propodus is about twice as long as the carpus, not widened distally and rounded at its distal extremity, not obliquely-truncate, but the distal margin is not concave, as stated and figured by Laurie (for the ♂); in my specimen the carpus is not so short and globular as figured by this author.

Chelae entirely covered with a dense toment, so as to conceal the exact shape of the fingers; palm inflated, (its basal ventral part flattened in the ♂, according to Laurie), about as long as the fingers, which are apparently gaping in the ♂ (Laurie), but nearly apposed in the ♀; fingers nearly straight with downy hairs along the free margins, decreasing regularly in height distally, but abruptly curved near the tip, especially in the case of the dactylus; at the inner margin of the latter two teeth are found, the larger one being placed quite near the base, corresponding to two similar, but larger teeth on the opposite border of the fixed finger.

The walking legs are short, slender, about $1^1/_2$ times the length of the carapace, hairy, especially along the inner border of the propodite; the last pair is not appreciably weaker (though really shorter) than the preceding pair; the dactyli of the first three pairs are strongly hooked, tapering to a fine point, those of the last pair, however, are much more straightened, curved only quite near the tip, hairy, flattened and notably longer than in the preceding pairs. This disproportion of the dactyli is much better pronounced in the ♀ then in the ♂ (Laurie).

The eggs heaped up beneath the very bulky abdomen are numerous and of remarkable large size in such a small species, measuring about 0.55 mm. in diameter. Nobili observed that the eggs in *Ostracotheres* vary greatly in size according to the species: in *O. affinis* they are no less than 4 times as large as in *O. spondyli*, but exact measurements are not given.

The "Siboga" specimen affords the first record of this genus from the Indo-Malayan Archipelago.

Dimensions in mm.:

Length of carapace.	3.95
Breadth of carapace	4.2
Dactyli of 3d pair of walking legs .	0.85
Dactyli of 4th pair of walking legs .	1.2

Subfam. PINNOTHERELINAE.

In the typical representatives (of the genera *Pinnotherelia* H. Milne-Edwards and *Pinnixa* White) the ischium of the external maxillipeds, though distinct, is much smaller than the merus, and forms together with this merus a broad plate, the longitudinal axis of which, like in the *Pinnotherinae*, though not quite transverse, is directed obliquely to the median axis of the animal; the palp is very large and fills to a great extent the gap between the maxillipeds, its joints are produced beyond each other and the propodus projects largely beyond the basal part of the broad dactylus [1]). The carapace (in *Pinnixa* at least) is much broader than long, and the last pair of legs is often reduced in size.

Closely related to *Pinnixa* is *Tetrias* Rathbun (ALCOCK even considers the latter merely a subgenus of the former), but the external maxillipeds are placed more longitudinally, the segments of their palps are much broadened and flattened, and the propodus is truncate, not produced beyond the insertion of the dactylus.

A fourth genus, *Pseudopinnixa*, Ortmann, also certainly belongs to the present group, but the carapace is subcircular (at least in the type species) and the segments of the palp of the external maxillipeds are placed end to end, the dactylus being very much elongate and cylindrical.

ALCOCK [2]), though in two cases doubtful about the matter, includes still the following genera:

Malacosoma de Man. I have examined the type specimen of the only species known and can assert that it truly belongs to the *Asthenognathinae*.

Opisthopus Rathbun. This genus is very little known. Miss RATHBUN herself ranges it among the *Asthenognathinae*. The external maxillipeds seem to resemble those of the next genus.

Tritodynamia Ortmann. Notwithstanding some unmistakable resemblances to the *Pinnotherelinae* it seems preferable to refer this genus also to the *Asthenognathinae*.

In recent years Miss RATHBUN founded a genus *Mortensenella*, referred by her to the *Pinnotherelinae*. If we adhere, however, to the typical genera of this group, the genera *Mortensenella* does not belong to it, and provisionally I prefer to range it among the *Asthenognathinae*,

1) This arrangement agrees with what is found in *Pinnaxodes*, a genus of the preceding subfamily, which, however, is connected by gradual transitions to *Pinnotheres*.

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 294.

as merus and ischium of the external maxillipeds are subequal and the palp is minute and of normal shape.

As to *Parapinnixa* Holmes [1]) I am completely at loss where to place it, as the literature is inaccessible to me. ALCOCK brought the genus to the *Pinnotherinae*.

Most of the genera and species of the present group live on the west coast of America and at Japan.

Key to the genera *Pinnotherelia*, *Pinnixa*, *Pseudopinnixa* and *Tetrias*:

1. Palp of ext. maxillipeds long, narrow, cylindrical, segments placed end to end. Carapace not distinctly broader than long 2
   Palp of ext. maxillipeds very broad, flattened, surpassing the merus in bulk. Carapace distinctly broader than long. 3
2. Carapace subrectangular. Last pair of legs not reduced in size. Species from Peru and Chile . . . . . **Pinnotherelia** H. Milne-Edw. et Lucas
   Carapace subcircular. Last pair of legs reduced in size. Species from Japan . . . . . **Pseudopinnixa** Ortmann
3. Carapace generally more than twice as wide as long, usually with a transverse crest across cardiac region. Propodus of ext. maxillipeds projecting with its rounded distal end beyond the insertion of the dactylus. Species largely represented along American coasts. **Pinnixa** White
   Carapace less than twice as wide as long. Palp of ext. maxillipeds flattened, very much hairy, propodus and dactylus widening distally, broadly-triangular, merus with a transverse row of hairs . **Tetrias** Rathbun

Pinnotherelia H. Milne-Edwards et Lucas.

1843. *Pinnotherelia* H. Milne-Edwards et Lucas. Voy. Amér. mér. D'ORBIGNY, v. 6, prt 1, p. 24.

The only known species is *P. laevigata* (see RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 51, f. 3), which inhabits the coasts of Peru and Chile.

Pseudopinnixa Ortmann.

1894. *Pseudopinnixa* Ortmann. Zool. Jahrb., Syst., v. 7, p. 694.

The genus has been founded on *Ps. carinata* Ortmann (l. c., p. 694, pl. 23, f. 6), which lives apparently abundantly in Tokyo Bay.

1) Proc. Californ. Ac. (2), v. 4, prt 2, 1895, p. 587, founded on the West American "*Pinnixa*" *nitida* Lockington. HOLMES (l. c., p. 565) first used the term *Pseudopinnixa*, but becoming aware of its being praeoccupied by ORTMANN shortly before, he changed it into *Parapinnixa*.

Pinnixa White.

1846. *Pinnixa* White. Ann. Mag. Nat. Hist., v. 18, p. 177.
1876. *Tubicola* Lockington. Proc. Californ. Ac., v. 7, p. 55.

This genus contains 18 species, which are remarkable by their transverse carapace (generally twice as wide as long), by the penultimate pair of legs being usually much larger than the last pair, and by the shape of the maxillipeds, the palp of which is very bulky, propodus and dactylus being dilated and the former largely projecting beyond the insertion of the latter. There is often a transverse crest across the cardiac region of the carapace.

As far as is known, all species are commensals of worm-tubes (hence also the term *Tubicola* used by Lockington). In general appearance and in habits these species exhibit a striking resemblance to the *Hexapodinae*, which are also known to inhabit tubes of Annelids. We ignore whether this remarkable resemblance be due to a real phylogenetic affinity or to similarity of conditions of life.

Species living at the Atlantic coasts of America:

P. cylindrica (Say) nec Stimpson, S. J. Smith.

1818. *Pinnotheres cylindricum* Say. Journ. Ac. Sc. Philadelphia, v. 1, p. 452.
1846. *Pinnixa cylindrica* White, l. c.
1860. *Pinnixa laevigata* Stimpson. Ann. N. York Lyceum, v. 7, p. 68.

Hab. United States.

P. monodactyla (Say), l. c., p. 454. Hab. United States.

P. sayana Stimpson, l. c., p. 236.

Pinnixa cylindrica S. J. Smith nec Say.

Hab. United States.

P. chaetopterana Stimpson, l. c., p. 235.

Pinnixa cylindrica Stimpson, l. c., p. 68, nec Say.

See also: Pearse, Biol. Bull. Woods Hole, Mass., v. 24, 1913, p. 102, figs. Hab. United States.

P. minuta Rathbun. Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 21, textfig. 4. Hab. Majaguez Harbour, Porto Rico.

P. brevipollex Rathbun, Proc. U. S. Nat. Mus., v. 21, 1899, p. 605, pl. 43, f. 6. Hab. Gulf of San Matias, Argentina.

This species, as the author states, is nearly related to *P. monodactyla*, but its carapace is proportionately broader.

The following species occur at the coast of California [1]:

P. occidentalis Rathbun.

1893. Rathbun, Proc. U. S. Nat. Mus., v. 16, p. 248.
1900. Holmes, Occas. Pap. Californ. Ac. Sc., v. 7, p. 89.
1904. Rathbun, Harriman Alaska Exp., v. 10, p. 187.
1910. Weymouth, Leland Stanford Jr. Univ. Publ., n° 4, p. 56, textfig. 3.

1) A key to all the Californian species is given by Weymouth (Leland Stanford Jr. Univ. Publ., n° 4, 1910, p. 55).

P. californiensis Rathbun.

1893. Rathbun, Proc. U. S. Nat. Mus., v. 16, p. 249.
1899. Rathbun, Ibid., v. 21, p. 605.
1900. Holmes, Occas. Pap. Californ. Ac. Sc., v. 7, p. 90.
1904. Rathbun, Harriman Alaska Exp., v. 10, p. 187.
1910. Weymouth, Leland Stanford Jr. Univ. Publ., n° 4, p. 56.

P. tubicola Holmes.

1895. Holmes, Proc. Californ. Ac. Sc. (2), v. 4, p. 569, pl. 20, f. 17—18.
1900. Holmes, Occas. Pap. Californ. Ac. Sc., v. 7, p. 91.
1904. Rathbun, Harriman Alaska Exp., v. 10, p. 187.
1910. Weymouth, Leland Stanford Jr. Univ. Publ., n° 4, p. 57, textfig. 4.

P. littoralis Holmes.

1895. Holmes, Proc. Californ. Ac. Sc. (2), v. 4, p. 571, pl. 20, f. 14—16.
1900. Holmes, Occas. Pap. Californ. Ac. Sc., v. 7, p. 91.
1904. Rathbun, Harriman Alaska Exp., v. 10, p. 187.
1910. Weymouth, Leland Stanford Jr. Univ. Publ., n° 4, p. 58, textfig. 5.

P. faba (Dana).

1851. *Pinnothera faba* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253.
1852. *Pinnothera faba* Dana. U. S. Expl. Exp., Crust., p. 381, pl. 24, f. 4.
1900. *Pinnixa faba* Holmes. Occas. Pap. Californ. Ac. Sc., v. 7, p. 93.
1904. *Pinnixa faba* Rathbun. Harriman Alaska Exp., v. 10, p. 188.
1910. *Pinnixa faba* Weymouth. Leland Stanford Jr. Univ. Publ., n° 4, p. 59, textfig. 7.

P. longipes (Lockington).

1876. *Tubicola longipes* Lockington. Proc. Californ. Ac. Sc., v. 7, p. 55.
1877. *Pinnixa longipes* Streets et Kingsley. Bull. Essex Inst., v. 9, p. 107.
1900. *Pinnixa longipes* Holmes. Occas. Pap. Californ. Ac. Sc., v. 7, p. 92.
1904. *Pinnixa longipes* Rathbun. Harriman Alaska Exp., v. 10, p. 187.
1910. *Pinnixa longipes* Weymouth. Leland Stanford Jr. Univ. Publ., n° 4, p. 58, textfig. 6.

From the coast of Panama to those of Peru and Chile the following species are met with:

P. transversalis H. Milne-Edwards et Lucas. Literature: Ortmann, Zool. Jahrb., Syst., Bd 10, 1897, p. 329; Lenz, Zool. Jahrb., Syst., Supplementbd 5, 1902, p. 764; Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 46, f. 1. Hab. from Panama to Punta Arenas, Patagonia.

P. panamensis Faxon, Bull. Harvard Mus., v. 24, 1893, p. 158. Hab. Panama.

P. affinis Rathbun, Proc. U. S. Nat. Mus., v. 21, 1899, p. 606, pl. 43, f. 7—9. Hab. Panama.

P. valdiviensis Rathbun, Rev. Chil., Hist. Nat., v. 11, 1907, p. 45, pl. 3, f. 2—3, textfig. 1. Hab. Valdivia, Chile.

Two species are known from the coast of Japan:

P. penultipedalis Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 695, pl. 23, f. 7; Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 143.

This species has been recorded from Hongkong and from Nagasaki.

P. tumida Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 143.

Unlike other species of the genus, this species was found in the holes of a Holothurian (*Caudina*), in the Bay of Hakodadi (Japan).

Finally there is a species, *P. brevipes* H. Milne-Edwards, Ann. Sc. Nat. (3), t. 20, 1853, p. 220, from Madagascar, but this species does not seem to belong here (see p. 284—285).

Tetrias Rathbun.

1899. *Tetrias* Rathbun. Proc. U. S. Nat. Mus., v. 21, p. 607.

The genus has been established on *T. scabripes* Rathbun, l. c., p. 608, pl. 43, f. 12—14, from Lower California.

Alcock [1]) places also "*Pinnixa*" *fischeri* A. Milne-Edwards in the genus, but regards the latter as merely a subgenus of *Pinnixa*. I cannot agree with him. The carapace in *Tetrias* is much narrower, the transverse cardiac ridge, so commonly met with in *Pinnixa*, is altogether absent, and the whole surface of the carapace, instead of being smooth and glabrous, is thickly pubescent and granulate. In the external maxillipeds the propodus is not projecting beyond the insertion of the dactylus, but both segments are inversely-triangular, especially the former, widening distally and with a dense row of feathered hairs along outer and distal margin. The walking legs are densely hairy; the second pair, not the third as in *Pinnixa*, is the longest, the last pair is much reduced, spinous along posterior margin; the dactyli of all the walking legs are very short, nearly disappearing among the long setae of the propodites.

1. *Tetrias fischeri* (A. Milne-Edwards). Pl. 18, Fig. 1.

1867. *Pinnotheres fischeri* A. Milne-Edwards. Ann. Soc. Ent. France, t. 7, p. 287.
1873. *Pinnixa fischeri* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 319, pl. 18, f. 3.
1888. *Pinnixa fischerii* de Man. Arch. Naturgesch., Jhrg. 53. 1., p. 385, pl. 17, f. 2.
1900. *Tetrias fischeri* (*Pinnixa (Tetrias) fischeri*) Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 336.

Stat. 181. Ambon. Depth 36—51 m. 1 ♂, on reef.

The figure of the whole animal, as given by Milne-Edwards, does not agree with what is found in the "Siboga" specimen. In the old example (a ♀) the carapace is represented broader than in my specimen [2]), in which the breadth is about 1.4 times the length, and neither the setose covering of the whole animal nor the granulation of the carapace is correctly given, unless it must be admitted, what is quite likely, that adult individuals rather considerably differ from young ones.

De Man examined both sexes and stated that in the ♂ nearly the whole carapace is finely granulate and tomentose, with exception of some few regions (hind part of mesogastric and anterior portion of cardiac area, with its surrounding parts), which are smooth and glabrous. In my specimen, which is smaller, the gastric region is, like the rest of the surface, granulate

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 336.

2) Milne-Edwards' measurements are in some way quite erroneous: the width of the carapace is said to be 15 mm. (by typographical error: cm.), the length 58 mm. (!)

and pubescent, but the granules are much smaller; this gastric region is not subdivided. On the whole posterior third of the carapace the granules are largest and most crowded; cardiac and branchial areas are not discernable. The surface is but little vaulted in longitudinal direction, and nearly straight transversely. The whole animal is soft, the skin being membranaceous and yielding to a slight pressure.

Front finely granulate, with a transverse row of short hairs along anterior margin, narrowing anteriorly, regularly deflexed; anterior margin exactly twice as broad as either orbit, straight in dorsal view, but in reality projecting in the median line and continued into a thin nasal plate, separating the nearly transversely-folded antennules, lateral angles of the front pronounced, bent downward. Fronto-orbital distance half the greatest width of carapace; orbits small, well defined; eye-stalks short, thick, movable; eyes well developed, with black pigment. Lateral margins of carapace regularly curved, obtuse; posterior margin of carapace little convex, longer than fronto-orbital distance.

Epistome very short, but distinct, strongly folded transversely. Antennae unusually long, as long as width of front, the three free basal segments of the peduncle elongate, the terminal one 1.5 times as long as the preceding; flagellum consisting of seven segments, the penultimate one with one strong hair, the terminal segment with three such hairs. Pterygostomian regions finely granulate, subhepatic and subbranchial regions with a dense and soft fur of feathered hairs. Buccal cavity rectangular, with the anterior angles rounded, much wider than long. External maxillipeds (fig. 1*a*) very widely gaping, the gap being filled to a great extent by the broadly-expanded palpi, margins thickly fringed with very long, silky, flexible, bearded hairs. DE MAN already accurately described and figured these maxillipeds, but I should wish to emphasize a few points: DE MAN states that the ischium, which is distinctly smaller than the merus, is broader than long, but the contrary is shown in his figure, and the ischium in my specimen is indeed broader than depicted by DE MAN, its outer surface is crossed by a transverse row of feathered hairs; the merus is longer than the ischium, widening distally, with the inner margin straight and fringed with very long hairs, the outer margin convex, likewise hairy, the external surface of the merus is crossed by a distinct transverse row of feathered hairs similar to those on the ischium, but the hairs are much longer [1]); the palp is extremely bulky, more so than ischium and merus together, and the outer margins of carpus, propodus and dactylus, which are placed end to end, are heavily fringed with very long, feathered hairs, carpus and propodus are of subequal length, bent rectangularly to each other, the former is subquadrate, the latter broadly-triangular and its antero-external angle, which projects freely, is provided with an additional tuft of dense hairs, the dactylus is of the shape of the propodus, but somewhat shorter, much flattened, and the hairs fringing the external margin are continued along the distal border, though keeping here the same transverse course and not expanded fan-like. The close resemblance of these maxillipeds to those of the genus *Thaumastoplax* Miers strongly suggests a near affinity between the two genera, which view, of course, is strengthened by the great reduction of the last part of legs in *Tetrias*. We must,

1) It is this transverse row which seems to be one of the generic characteristics, as it is also described and figured in *T. scabripes* Rathbun.

however, not overlook the fact that the dactylus of the external maxillipeds is differently inserted to the propodus: in *Thaumastoplax* it is implanted at the antero-external angle of the propodus, and the internal angle is bulging outward, whereas in *Tetrias* exactly the reverse is shown. In *Thaumastoplax* (at least in *T. orientalis* and *T. chuenensis*) there is also a transverse row of hairs across the maxillipeds. The abdomen of the ♂, however, differs widely in both genera.

Similar feathered hairs as are repeatedly spoken of in describing the external maxillipeds completely cover the chelipeds and to a lesser extent also the walking legs. Beneath this soft coating numerous pearly granules are hidden on the chelipeds; these granules assume the shape of projecting, obtuse spines along the basal half of the outer border of the meropodite, the anterior margin of the carpopodite, and the inferior border of the chela, where they are continued to the tip of the immovable finger. The chelae are equal in size, much compressed, as high as long, and slightly longer than the fingers; the outer surface is provided with longitudinal rows of granules, the inner surface is devoid of granules, but in the middle a longitudinal row of hairs is found; the fingers are short, high at the base, not greatly curved near the tip, compressed, slightly gaping, back of dactylus with long hairs, cutting margins of both fingers nearly entire.

The walking legs are rather short, the first three pairs subequal (the second pair slightly the longest) and about $1^1/_2$ times the length of the carapace, the fourth pair is greatly reduced in size and reaches only to the end of the meropodite of the preceding pair. The lower surface of the legs is almost naked, but the upper one thickly clad with soft hairs, very long along the margins. Meropodite not yet three times as long as broad, not widening distally, lower border finely crenulate; carpo- and propodite short, with a longitudinal row of very long, feathered hairs on dorsal surface, all directed inward. As these hairs are continued on the upper side of the dactylus and the likewise long hairs along the inner border of the propodite also fringe the inner side of the dactylus, the latter, which is very short, is almost completely hidden. The lower border of the meropodite of the last pair of legs (fig. 1*b*) bears some few spines, and the hairs of these legs are by far not so densely crowded as is the case in the preceding pairs. At the inner border of the propodite, near the base of the dactylus, two spines are placed side by side.

The long and narrow abdomen of the ♂, with the terminal segment nearly circular and reaching quite to the external maxillipeds (as the deep trench of the sternum receiving the abdomen is continued forward into the buccal cavity), has been well described by DE MAN. The first abdominal appendages are flattened, hairy and reach beyond the middle of the fifth segment of the abdomen; their distal part is curved somewhat outward and the tip is obtuse.

The type species, *T. scabripes* Rathbun, is distinguished by the more distinctly-rectangular, not transversely-oval, carapace, with a spinule on outer part of hepatic regions, and by the basal parts of the meropodites of the first two pairs of walking legs being armed with 1—3 spinules.

The present species has been found at New Caledonia, Amboyna and the Andamans.

At the first locality it was found associated with *Fistulana clava* (a boring Lamellibranch), at the second in the tubes of an Annelid. The "Siboga" specimen was found at this latter locality, but, like that of ALCOCK from the Andamans, it was apparently freely living on the coral reef.

Dimensions in mm.:

Fronto-orbital distance	4.—
Breadth of carapace	8.—
Length of carapace	5.7
Length of penultimate pair of legs	8.8
Length of last pair of legs	4.35
Distance between bases of last pair of legs	6.6
Breadth of abdomen at base	2.15

My specimen is about the size of that of ALCOCK.

Subfam. XENOPHTHALMINAE.

This subfamily has been instituted by ALCOCK on a single genus.

Xenophthalmus White.

1846. *Xenophthalmus* White. Ann. Mag. Nat. Hist., v. 18, p. 177.

As is well known, the genus is easily recognizable by the orbits, instead of being marginal and transverse (or nearly so), being formed by longitudinal slits in the carapace, so that the narrow front is clearly defined laterally. An epistome is absent; the external maxillipeds are broad, parallel, ischium and merus equally long, joints of palp flattened, palp somewhat spirally twisted, extremely slender, rod-like, concealed in outer view. Chelipeds, even in ♂, very small and weak, much more so than the walking legs, the meropodits of which are armed along their posterior margin with a row of spines. Abdomen of both sexes narrow, consisting of seven separated segments.

Four species in all have been assigned to the genus. Two of these, the type species *X. pinnotheroides* White and *X. obscurus* Henderson are well established. A third species is *X. duplociliatus* Sluiter [1]). This species, according to the description, resembles the type species, but the chelipeds are much stronger, broadly-flattened and "lepelvormig gebogen" (shaped like a spoon); besides the under surface of the posterior legs is brightly red, and the 3^{d} and 4th segment of the abdomen of the ♀ is provided with a transverse row of long hairs. SLUITER says that WHITE mentions the presence of bristles at the 3^{d} segment of the abdomen of the ♀, but the latter author's words on this subject are: "a long ciliated process proceeding from each end of the third joint". One cannot help thinking that WHITE mistook the (bifurcated) pleopod of the ♀, reaching beyond the 3^{d} segment, for this "ciliated process", for in reality the abdomen of the ♀ does not show any prominences on its exposed surface or on its borders.

1) Natuurkundig Tijdschrift Ned. Indië, Dl. 40, 1881, p. 163. Hab. harbour of Tandjong Priok (Batavia).

Finally there is a fourth species, *X. latifrons* Bürger[1]), which is so very aberrant that its being referred to the present genus is certainly erroneous. Firstly the carapace is only slightly broader than long; secondly the orbits, though longitudinal, are lying on the ventral, not on the dorsal side, of the cephalothorax, thirdly an epistome seems to be distinct and finally the external maxillipeds are widely different, resembling those of the *Pinnotherinae*: merus and ischium are fused to a single piece and the dactylus is inserted at the inner margin of the propodus, the exognath is of normal breadth, not rod-like.

Key to *X. pinnotheroides* and *X. obscurus*:

Carapace, at least anterior part, and walking legs hairy; orbits longitudinal, parallel to each other. Propodite of first pair of walking legs as broad as long . . . . . *X. pinnotheroides* White

Carapace glabrous, walking legs hairy towards the tip only; branchial regions of carapace with an oblique, low ridge; orbits somewhat oblique, divergent backward. Propodite of first pair of walking legs longer than broad . . . . . *X. obscurus* Henderson[2]).

1. *Xenophthalmus pinnotheroides* White.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 332.
RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 338, textfig. 22.

Stat. 4. Djangkar, east coast of Java. Depth 9 m. 7 ♂, 10 ♀.
Stat. 311. Sapeh Bay, east coast of Sumbawa. Depth 36 m. 1 ♂, 1 ♀.

The carapace is for the greater part smooth, but towards the antero-lateral margins, on the lateral parts of the hepatic regions, a thin covering of feathered hairs, such as are found fringing the whole of the lateral borders, is observed. The greatest breadth, at the level of the penultimate pair of legs, is nearly exactly 1.5 times the length of the carapace. A gastric area, not subdivided, and beginning immediately at the end of the orbits, is distinctly outlined by fine sulci and $2^1/_2$ times as long as broad; behind it a kind of urogastric portion is developed, which is again followed distally by a well defined cardiac region, somewhat broader and shorter than the gastric area. From the end of the orbits parts on each side an oblique, indistinct, straight crest to the constriction in the lateral margin of the carapace, and a similar, slightly curved crest is discernible on each branchial region. Except at the abruptly sloping lateral branchial regions the carapace is not vaulted transversely, and only moderately so in longitudinal direction.

The front is a distinct lobe, somewhat constricted near the base, with the anterior margin straight and the lateral angles greatly rounded; it is bordered laterally by the deep orbits, which are completely filled by the club-like eye-stalks. The orbits in young specimens

1) Zool. Jahrb., Syst., Bd 8, 1895, p. 387, pl. 9, f. 32, pl. 10, f. 32. Hab. Philippines.

2) Transact. Linn. Soc. London (2), v. 5, 1893, p. 394, pl. 36, f. 18—19; ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p, 333; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 338, pl. 2, f. 13, textfig. 23. Hab. Gulf of Martaban, Ganjam coast, Andamans, Gulf of Siam.

are rendered more conspicuous by a brown pubescence along their borders. Eyes very small. Lateral margins of carapace rather sharp, granulate, especially posteriorly, and separated by a constriction in the middle into two parts, the antero-lateral margins being regularly curved, and the postero-lateral ones straight, divergent backward towards the bases of the penultimate pair of legs. The lateral branchial regions are much declivous and defined dorsally by a longitudinal row of granules, parting from the bases of the last pair of legs. Posterior margin of carapace long, somewhat concave at the insertion of the abdomen.

The very minute antennulae are lying longitudinally beneath the front and do not project beyond its border. The antennae are rather strong, they are lying at the opening of the orbits. The latter are also closed by a minute tooth, situated at the outer wall of the orbit and running across to the front, without reaching the latter [1]). The basal joint of the antenna is short and thick, inserted beneath the lateral angle of the front, the second joint is long, cylindrical, more than 4 times as long as broad, the third joint is short, scarcely one-fourth of the length of the preceding, the flagellum consists of 5 joints. The two last joints of the peduncle are, like the anterior margin of the front, provided with long, feathered hairs. Pterygostomian regions much depressed, not inflated, smooth and glabrous. Buccal cavity wider than long, lateral margins upturned, concave; anterior border deeply hollowed, touching the antennulae and antennae, so that an epistome is formed. External maxillipeds broad, parallel to each other; merus and ischium subequal in length (see Miss RATHBUN's figure), with a faint longitudinal groove near outer margin in which long hairs are implanted, well separated by a somewhat angular suture, outer margin of ischium and merus regularly rounded; palp inserted at antero-internal angle of merus, carpus broadly-oval, disc-like, propodus and dactylus normally shaped, much shorter than carpus, placed end to end, propodus implanted at the centre of the ventral surface of carpus and perpendicular to the latter, dactylus again perpendicular to the propodus, directed backward towards the base of the palp, and parallel to the disc of the carpus [2]); the whole palp, especially propodus and dactylus densely fringed with long hairs. The exognath is very slender, rod-like, not widening at the base, concealed behind ischium and merus and reaching to the level of the greatest breadth of the latter joint; its flagellum is very short.

The chelipeds of all my specimens, even of the largest ♂, are exceedingly weak and slender, much shorter than the first pair of walking legs, and about as long as the carapace, but Miss RATHBUN states that in the ♂ the chelae are higher and stronger than in the ♀. Upper and outer border of arm and wrist, and both margins of chela fringed with long hairs, the row of hairs along upper margin of chela being double [3]); palm very low, longer than fingers; the latter acute, very slightly gaping near base and unarmed at the opposite margins, save a few exceedingly fine crenulations.

The walking legs are slender, ciliated, and in my specimens the third pair, which is the longest, is as long as, or longer than, twice the length of the carapace, though ALCOCK

1) This tooth has been observed already by WHITE; STIMPSON afterwards sought in vain for it.
2) This curious conformation of the palp has been already noticed by STIMPSON ("palpus spirally twisted").
3) In Miss RATHBUN's figure of the chela (of the ♀) it looks, as if the ventral row runs on the outer surface of the chela.

pretends that these legs are shorter than twice the said length. Basi- and ischiopodite with a sharp spine at distal margin, on the ventral side; these spines are continued along the posterior border of the meropodite, larger, curved spines generally alternating with obtuse prominences; in the last pair of legs these spines are almost absent. Propodite in the first pair somewhat distorted, so that the originally ventral side, which is greatly flattened and granular and forms a broadly-oval disc, nearly as broad as long, is turned to the dorsal side of the animal; dactylus broadly-triangular, depressed, as long as the preceding propodite, finely crenulate at the base of the lateral margins, and somewhat curved upward. In the middle pairs of legs the propodites are elongate, normal (in the third pair about three times as long as broad), and the dactyli long, greatly compressed, nearly straight. The propodite of the last part of legs is again short, fringed with very long, feathered hairs, and the dactylus is short, compressed, curved backward.

There is little difference between the abdomina of the sexes, that of the ♀ being narrow, like that of the ♂; all the segments are distinct. None of my ♀ is bearing eggs. The base of the abdomen of the ♂ occupies about two-fifths of the distance between the posterior pair of legs, the third segment is narrower than the first, the fifth somewhat constricted, the terminal segment is semi-circular (see Miss RATHBUN's figure), and reaches to the buccal cavity, from which the trench of the abdomen is, however, separated by a thin lamellar, movable plate, beneath which the anterior margin of the sternum projects in the form of a triangular tooth. The long first abdominal appendages, of the ♂ are obtuse at the tip, which is armed with a bunch of slender spines.

This species has been caught at the Philippines, in the harbour of Hongkong, near Batavia, in the Gulf of Martaban and in that of Siam. According to SLUITER it is not commensalistic in habits.

Dimensions in mm.:

	♂	♂	♂	♀	♀
Length of carapace	5.7	4.75	3.85	5.3	4.85
Breadth of carapace	8.6	7.—	5.95	8.—	7.15
Length of penultimate pair of legs .	12.1	9.9	9.25	10.6	10.2

Subfam. ASTHENOGNATHINAE.

No subfamily of the Pinnotheridae contains such heterogeneous elements as the present one. In some genera (*Asthenognathus*, *Tritodynamia*, *Mortensenella*) the last pair of legs is so very much reduced in size as to suggest a striking resemblance to what is found in *Pinnixa* etc., the more so because in one of these genera the carapace is sometimes twice as broad as long. As has been remarked already *Pinnixa* and its allies nearly resemble some genera of the subfamily *Hexapodinae*, which belong to the Goneplacidae. Perhaps a more direct link to the latter family, viz. to the *Rhizopinae*, is afforded by *Chasmocarcinops*, which much resembles *Camatopsis*: in these genera not only the carapace and the legs are very much alike, but the antennulae in both are not capable of being completely retracted, the basal joint completely

filling up the antennular fossa. A curious and much aberrant genus, *Hapalonotus* (= *Malacosoma*), with its globular and somewhat membranaceous carapace, connects the *Asthenognathinae* with the *Pinnotherinae*. It is not at all astonishing, then, that, the limits of the present subfamily are differently drawn, according to personal opinion of authors: *Opisthopus* has been referred by Alcock to the *Pinnotherelinae*, *Tritodynamia* and *Voeltzkowia* by their original authors to the *Hexapodinae*, afterwards by Alcock and Nobili to the *Pinnotherelinae*, etc.

In the present paper all the genera of Pinnotheridae, in which the ischium of the external maxillipeds, which are parallel to each other, is at least as long as, and generally even distinctly longer than, the merus, are included within the *Asthenognathinae*. This criterium, artificial as it may appear, is nevertheless the only one to discriminate the subfamily.

Key to the genera:

1. Last pair of legs considerably reduced in size, reaching about to end of meropodite of preceding pair 2
   Last pair of legs not very much weaker than preceding pair . 4
2. Carapace generally roughly hexagonal. External maxillipeds widely distant, ischium and merus separated by a distinct suture. Infra-orbital ridge present. 3
   Carapace with the lateral margins regularly curved. External maxillipeds close together; ischium and merus broad, nearly equal, subquadrate, separated by an indistinct suture; palp very small, inserted near antero-external angle of merus and consisting of three subequal segments, placed end to end. Fifth abdominal segment of ♂ constricted. Fingers of chela gaping, movable finger with a quadrangular tooth at inner margin. . . . . **Mortensenella** Rathbun
3. Merus of external maxillipeds slightly shorter than ischium, segments of palp placed end to end. . . . . **Asthenognathus** Stimpson
   Merus of external maxillipeds as long as ischium, dactylus of palp inserted at inner border of propodite. . . . . **Tritodynamia** Ortmann
4. Carapace globular, vaulted, membranaceous, adorned with a reticulating pattern of brown markings . . . . . **Hapalonotus** Rathbun (= *Malacosoma* de Man)
   Carapace not vaulted transversely, hard, shining or granulate . 5
5. Carapace nearly circular, but somewhat broader than long, regions not defined. External maxillipeds with the palp larger, the dactylus being triangular, distally truncate and inserted at inner border of propodus, overreaching the latter segment. Walking legs unarmed, dactyli well developed, half as long as preceding propodites. Species of California, living in Holothurians and in the Mollusc *Lucapina crinulata*. . . . . **Opisthopus** Rathbun

Carapace quadrangular or transversely-elliptical, smooth or granulate and pubescent. Palp of external maxillipeds small, with the joints placed end to end, ischium much stronger than merus. 6

6. Carapace quadrangular, about as broad as long, granulate and pubescent, with two tomentose and longitudinal branchio-cardiac grooves. Front bilobed. Walking legs much longer than breadth of carapace; meropodites sharply crenulate throughout; dactyli long, those of last pair curved backward . . . . . **Chasmocarcinops** Alcock

Carapace quadrangular or transversely-elliptical, for the greater part smooth and shining, regions little or not defined. Walking legs short, not exceeding breadth of carapace; meropodites not sharply crenulate throughout; dactyli very short, sometimes nearly invisible 7

7. Carapace quadrangular, with some isolated patches of a short pubescence. Front triangular. Ischium of external maxillipeds widening towards merus, broadest at anterior margin and with the antero-internal angle sharp and freely projecting, merus small, subcircular, with palp inserted at middle of the convex anterior margin. . . . . **Voeltzkowia** Lenz

Carapace transverse, especially so in the ♀, lateral margins regularly curved, sharp and entire. Anterior margin of front straight. Merus of external maxillipeds quadrangular, little narrower, but much shorter than ischium, with palp inserted near antero-external angle of the concave anterior margin. Walking legs short; posterior margin of meropodite with some small teeth; dactyli extremely minute, scarcely visible . . . . . **Aphanodactylus** n. g.

Asthenognathus Stimpson.

1858. *Asthenognathus* Stimpson. Proc. Ac. Sc. Philadelphia, 1858, p. 107.

This genus contains two species.

Key to the species:

Posterior margin of carapace 1.5 times as long as fronto-orbital distance. Species from Japan . . . . . *A. inaequipes* Stimpson

Posterior margin of carapace equal to fronto-orbital distance. Species from the Gulf of Siam . . . . . *A. hexagonum* Rathbun.

1. *Asthenognathus inaequipes* Stimpson.

1858. *Asthenognathus inaequipes* Stimpson. L. c., p. 107.
1907. *Asthenognathus inaequipes* de Man. Transact. Linn. Soc., London (2), v. 9, p. 392, pl. 31, f. 4—6.
1907. *Asthenognathus inaequipes* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 140, pl. 14, f. 1.

This species has been long known only by STIMPSON's original diagnosis, until DE MAN gave a very elaborate description. In STIMPSON's posthumous paper a useful figure of the whole animal is to be found. Hab. east coast of Nippon, in 30 fathoms. DE MAN gives as locality: "Inland Sea of Japan, in deep water".

2. *Asthenognathus hexagonum* Rathbun.

1909. *Asthenognathus hexagonum* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 111.
1910. *Asthenognathus hexagonum* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 339, pl. 2, f. 14, textfig. 24.

Hab. Gulf of Siam.

Tritodynamia Ortmann.

1894. *Tritodynamia* Ortmann. Zool Jahrb., Syst., Bd. 7, p. 692.

ORTMANN referred his genus to the *Hexapodinae*, chiefly on account of the considerable reduction of the last pair of legs. DE MAN, in describing *Asthenognathus inaequipes*, remarked that the present genus might belong to the *Asthenognathinae*. Yet Miss RATHBUN, (l. c., 1910, p. 340), who simply unites *Tritodynamia* with *Asthenognathus*, in my opinion goes too far, for the insertion of the dactylus of the external maxillipeds is different in both genera, as has been proved by NOBILI.

This latter author, in adding to the type species, *T. japonica* Ortmann (l. c., p. 693, pl. 23, f. 5) a new one, *T. horváthi* (Ann. Mus. Hung., v. 3, 1905, p. 407, pl. 10, f. 1), sharply discriminates the two species, so that a reference to his paper may suffice. The genus is only known from the coasts of Japan.

Mortensenella Rathbun.

1909. *Mortensenella* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 111.

Miss RATHBUN referred her genus to the *Pinnotherelinae*, but on account of the shape of the external maxillipeds, the palp of which is very small and not broadly expanded, (ischium and merus subequal and separated by a faint suture) I prefer to range it among the present subfamily. It is remarkable that the chela of the only species known much resembles that of *Tritodynamia horváthi* Nobili. The genus is founded on *M. forceps* Rathbun (see K. Dansk. Vid. Selsk. Skr., Afd. 5, n° 4, 1910, p. 337, pl. 1, f. 18, textfig. 21), which inhabits the Gulf of Siam.

Hapalonotus Rathbun.

1879. *Malacosoma* de Man. Notes Leiden Mus., v. 1, p. 67 (praeocc.).
1897. *Hapalonotus* Rathbun. Proc. Biol. Soc. Washington, v. 11, p. 164.

The name *Hapalonotus* has been proposed by Miss RATHBUN in order to replace

Malacosoma, which latter term was already used by HÜBNER in 1816 for a genus of Lepidoptera (and by CHEVROLAT in 1834 again for a genus of Coleoptera).

ALCOCK referred this genus doubtfully to the *Pinnotherelinae*, but it certainly belongs to the present subfamily.

The only known species is:

1. *Hapalonotus reticulatus* (de Man). Pl. 18, Fig. 3.

1879. *Malacosoma reticulatum* de Man. L. c., p. 67.

This remarkable species has been never found back since its first discovery, although numerous collections were made afterwards at the very locality (Amboyna), where it was originally found. The only known specimen (a ♀) is still preserved in the Leiden Museum and I take this opportunity to make it better known, especially because no figure of it has been published.

At first sight the animal presents the outer aspect of a very large *Pinnotheres*: the carapace is globular, membranaceous, and little broader than long; the lateral margins are greatly rounded and inflated, especially the anterior ones. In the anterior part the carapace is nearly straight transversely, but it is much more vaulted posteriorly, across the branchial regions. In lateral aspect of the animal the anterior portion of the carapace, with the front, is nearly perpendicular, but in dorsal view the anterior margin of the latter is just visible, together with the small and thick eye-peduncles. The whole carapace is covered by very characteristic reticulating meshes, bordered by thick anastomosing lines of a brown colour and remarkably symmetrically distributed; this pattern has apparently lost nothing of its strength, notwithstanding the animal's being preserved in alcohol during more than half a century. There are nowhere any granules on the surface and the various regions are ill defined: on the gastric region we observe two transverse, oval pits, each of them connected by a groove to a similar depression in the middle of the hepatic region: there are two branchio-gastric or branchio-cardiac grooves, but there is no cervical sulcus between them, and the intestinal region is faintly outlined.

The front is regularly arched, its anterior margin is thickened and faintly bilobed in the middle. Orbits small and shallow, filled by the short, globular, movable eye stalks, eyes distinct, black. The fronto-orbital distance measures nearly half the greatest width of the carapace. As has been said the lateral margins, especially anteriorly are rounded and inflated, posteriorly they are not at all indicated, but here we observe a fine groove running straight to the implantation of the last pair of legs; this line is continued forward on the subhepatic and pterygostomian regions and proves to be the pleural groove, ending at the antero-external angle of the buccal cavity. Posterior margin of carapace nearly straight, strongly rimmed and equal in length to base of front.

Antennulae robust, folded transversely in rather incomplete fossae. Antennae extremely small, second joint of peduncle quadrate, flagellum very short, consisting of only two joints, but perhaps broken off (fig. 3*a*). Epistome present. Side walls of cephalothorax, like the carapace, entirely smooth and glabrous, except of course at the entrance of the afferent

channels to the branchial cavity, near the base of the chelipeds; some of the anastomosing lines of the carapace extend also to the subhepatic and pterygostomian regions. Buccal cavity quadrate, with the lateral borders subparallel and the anterior angles rounded. External maxillipeds parallel, rather broad, leaving only a narrow gap between than (fig. 3*a*); upper margin of ischium and merus neither grooved nor hairy; ischium longer than broad and distinctly longer than merus, suture between them very distinct, merus broadly-oval, nearly circular, external margin rather regularly curved; palp inserted at its summit [1]), longer than merus, consisting of three joints, placed end to end, dactylus somewhat longer than propodus; exognath thick, but flattened at outer surface, for the greater part exposed, almost half as broad as the ischium and not narrowing towards its summit.

The chelipeds and some of the walking legs are lost; on the left side the ambulatory legs of the second, third and fourth pair, on the right only those of the fourth pair are extant. These remaining legs regularly decrease in length from before backward, the longest leg measuring exactly the breadth of the carapace. Some darker spots and bands are observed on their surface, in conformity with the pattern on the carapace. Mero-, carpo- and propodite are entirely smooth and hairless; the dactyli are provided with a few short hairs, about half as long as preceding propodites and made up of two parts, resembling those of the Xanthidae: the basal and greater portion is conical, thick and entirely straight, sharply marked off from the slender, horny, curved tip.

The abdomen of the ♀ is large, elongate (fig. 3*b*), covering the whole sternum and with a ribbon-like elevation in the middle, thickly fringed along the margins, the sutures separating the joints are wavy, and the last segment is the longest, nearly semi-circular. There are no eggs in my specimen.

The only known specimen has been collected long ago (in 1864) by Hoedt at Amboyna.

Dimensions in mm.:

Fronto-orbital distance	11.—
Length of carapace	20.5
Breadth of carapace	24.—
Length of second pair of walking legs	24.—
Length of fourth pair of walking legs	21.—

Opisthopus Rathbun.

1893. *Opisthopus* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 251.

This genus was referred to the *Asthenognathinae* by the author herself, on account of the ischium of the external maxillipeds being distinctly developed (probably longer than the merus); there is, however, some resemblance to the *Pinnotherinae*, and especially to the genus *Scleroplax*, by the dactylus of these maxillipeds being inserted at the inner border of the propodus. It is to be regretted that this essential feature has never been figured. Alcock ranged the genus for some unknown reason among the *Pinnotherelinae*. Only one species is known.

1) „Affixed to its internal angle" according to de Man.

1. *Opisthopus transversus* Rathbun.

1893. *Opisthopus transversus* Rathbun. L. c., p. 252.
1900. *Opisthopus transversus* Holmes. Occ. Pap. Californ. Ac. Sc., v. 7, p. 97.
1904. *Opisthopus transversus* Rathbun. Harriman Alaska Exp., v. 10, p. 188.
1910. *Opisthopus transversus* Weymouth. Leland Stanford Jr. Univ. Publ., n° 4, p. 61, textfig. 9.

The species, which is not uncommon along the coast of California, inhabits a Holothurian (*Stichopus californicus*) and a kind of boring limpet (*Lucapina crenulata*). According to WEYMOUTH, the only author, as far as I know, who gave an outline of the animal, though not of its external maxillipeds, the suture between ischium and merus of these maxillipeds varies considerably in distinctness in various individuals, and the abdomen of the ♀ "varies from a width greater than that of the carapace to a size no greater than that of the male".

Chasmocarcinops Alcock.

1900. *Chasmocarcinops* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 334.

This genus again contains but a single species.

1. *Chasmocarcinops gelasimoides* Alcock.

1900. *Chasmocarcinops gelasimoides* Alcock. L. c., p. 334.
1903. *Chasmocarcinops gelasimoides* Alcock. Ill. Zool. "Investigator", Crust., prt 10, pl. 62, f. 2—3.
1910. *Chasmocarcinops gelasimoides* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 340, pl. 1, f. 10, pl. 2, f. 12.

Stat. 115. Kwandang Bay, north coast of Celebes. Depth 31 m. 2 ♀.
Stat. 213. Saleyer Island, south of Celebes. Depth up to 36 m. 1 ♂ juv.

This species has been well described by ALCOCK and excellent figures have been given already. Besides the "Siboga" specimens I had the opportunity of examining four adult specimens (1 ♂, 3 ♀), collected by Prof. SLUITER many years ago in the Bay of Batavia, and belonging to the Amsterdam Zoological Museum.

The carapace is but little broader than long, with the postero-lateral margins but very faintly divergent backward, almost parallel. It is much curved downward in its anterior part, but the front is visible from above, and its surface is provided with numerous granules, but one patch on each hepatic region and one on each branchial area are destitute of such granules. The regions are rather well defined and it are especially two longitudinal, somewhat pubescent branchio-cardiac and gastro-hepatic grooves, which are conspicuous.

Front small, bilobed; its anterior margin, as seen in facial view, is concave [1]). Orbits deep, distinctly seen in dorsal aspect, filled by the globular and granulate eye-peduncles, which present on their ventral face, in the middle, a faint speck of pigment. Fronto-orbital distance about one-fourth of the greatest width of the carapace. Antero-lateral margins sweeping backward with an elegant curve, hairy, rather sharp, granulate, the granules being arranged in crowded

1) ALCOCK figures it as consisting of two prominent lobes.

groups near the orbit, but in a single row and assuming the shape of minute serrations further backward; postero-lateral margins obsolete. Posterior margin convex, straight in the middle, provided with a finely granulate rim.

Antennulae rather robust, not capable of being retracted within the large fossae, which are completely filled by the basal joint, a character of this species shared by *Camatopsis* Alcock, to which also in general appearance a close resemblance may be noticed. Antennae standing in the wide orbital hiatus, the two last joints of the peduncle free, subequal in length, little longer than broad, flagellum long, consisting of about twelve joints, nearly hairless. Pterygostomian regions granulate, like the carapace, pleural groove deep, disappearing backward above base of cheliped, subbranchial regions hairy and granulate, perpendicular, with a large, entirely smooth and glabrous, somewhat hollowed facet above bases of walking legs. Epistome present, but strongly folded and short. Buccal cavity with the lateral margins somewhat divergent backward. External maxillipeds widely gaping, convergent forward; ischium elongate, slender, $1^1/_2$ times as long as wide, with a longitudinal, hairy groove; merus much smaller than ischium, distinctly separated by a transverse suture, about half as long as ischium, and little longer than broad, of an oval shape; palp normal, placed at summit of merus, consisting of three joints, placed end to end, dactylus somewhat shorter than propodus; exognath concealed in normal position, breadth about one-third of that of ischium; not narrowing distally and reaching only to suture between ischium and merus, flagellum long.

Chelipeds unequal in both sexes, but much more so in the ♂. Meropodite three-faced, swollen, with a row of hairs along upper border and unarmed. Wrist small, polished, inner angle not prominent. In the adult ♂ the right chela is much more bulky than the left: the palm is greatly swollen, owing to a very much prominent bulge of the inner surface; the whole chela is entirely smooth and polished, save some hairs at the fingers; these are not longer than the palm and irregularly curved, leaving a wide space between them, but meeting near tip, the inner margins being for the most part unarmed, but where they fit together an obtuse tooth, followed by some crenulations up to the acute tip, is observed (see Alcock's figure 3*a*). The left chela of the ♂ is as long as the right, but somewhat lower and much less inflated; the palm is shorter and the fingers are longer, nearly straight, fitting tightly together; finely crenulate at inner margin; movable finger with a low quadrangular tooth near base, fixed finger with 4—5 erect teeth, in the interspaces of which lower teeth are placed. In the ♀ and in the young ♂ the right chela resembles that of the left of the adult ♂, but the left chela is remarkable by being more elongate and lower, with the palm much shorter than the straight fingers, which are deflexed and the crenulation of which is more clearly marked than in the right chela, though the quadrangular tooth of the movable finger is wanting.

The walking legs are slender and the first three pairs, which are subequal, measure more than twice the length of the carapace; the last leg reaches to about the middle of the propodite of the preceding. Meropodite elongate, slightly narrowing distally, granulate at upper surface, posterior and especially anterior margin armed with numerous erect teeth; carpo- and propodite, like the dactylus, of first and second pair covered with woolly hairs, those of third pair almost naked and more slender than in the preceding pair. Dactylus slightly shorter than

propodites, compressed and hairy along the edges and on the ventral surface, entirely straight. The last pair of legs differs in several points: the armature of the meropodite is much less pronounced or even absent, carpo- and propodite, especially the latter, are flattened and subequal in length, and the anterior border of the former, like both margins of the propodite are fringed with long hairs, continued on both edges of the dactylus, which is fully as long as the preceding joint and strongly curved backward.

The abdomen of the ♂ is rather short, by far not reaching to the buccal cavity; at its base it covers only one-third of the interspace between the bases of the last pair of legs; the first two segments are short and provided with a transverse rim; the third segment is broader than the first, much projecting sideways, and indistinguishably fused with the two next segments, as ALCOCK already observed; the penultimate joint is broader than long and as long as the triangular seventh segment. The first abdominal appendages are robust, covered by the abdomen. Sternum granulate, especially at the end of the deep trench of the abdomen; ALCOCK stated that, like in *Camatopsis*, a narrow plate is intercalated between the 4th and the 5th segment, covering the external genital ducts.

The abdomen of the ♀ is seven-jointed, the penultimate segment being by far the strongest. One of the ♀ from the Bay of Batavia is bearing eggs, the diameter of which measures 0.77 mm.

ALCOCK obtained his specimens from Madras. The species seems to be abundant in the Gulf of Siam.

Dimensions in mm.:	1 ♂	2 ♀	3 ♂
Fronto-orbital distance	4.25	4.25	2.—
Length of carapace	10.—	10.—	4.1
Breadth of carapace	11.—	11.—	4.75
Length of right chela	12.5	9.5	3.3
Height of palm of right chela	5.25	3.—	1.1
Length of mobile finger of right chela	7.—	5.5	1.9
Length of left chela	10.—	10.—	4.1
Height of palm of left chela	4.25	2.75	1.2
Length of mobile finger of left chela	5.5	6.—	2.2
Length of penultimate pair of legs	23.—	21.—	8.25
Length of last pair of legs	17.—	16.5	7.—

N° 1 and 2 are from the Bay of Batavia (♀ egg-bearing), n° 3 is the young ♂ from Saleyer.

Voeltzkowia Lenz.

1905. *Voeltzkowia* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, Heft 4, p. 364.

LENZ refers his genus to the *Hexapodinae*, but the last pair of legs is normally developed. Provisionally I include it into the present subfamily.

The genus contains but a single species.

1. *Voeltzkowia zanzibarensis* Lenz.

1905. *Voeltzkowia zanzibarensis* Lenz. L. c., p. 364, pl. 47, f. 9.

Hab. Zanzibar.

Aphanodactylus n. g.

I propose this new genus for one species, which does not fit into any of the various genera. The external maxillipeds, which are longitudinally directed and subparallel to each other, and the ischium of which is distinctly longer than the merus, agree with those of the *Aesthenognathinae*. On the other hand the ♀ of the species, on which the genus is based, has its carapace nearly twice as broad as long and this, together with the occurrence of the species in tubes of Annelids, suggests some affinity to *Pinnixa*, but the walking legs are short, scarcely as long as the breadth of the carapace and their dactyli are so extremely minute, as to be almost invisible. It is this last character that is expressed in the generic name.

The type and only species is:

1. *Aphanodactylus sibogae* n. sp. Pl. 18, Fig. 2.

Stat. 313. Sapeh Bay, north coast of Sumbawa. Depth up to 36 m. 1 ♂, 1 ♀. In tubes of a Terebellid (*Loimia*).

The small crabs obtained present a smooth and shining carapace, entirely glabrous and distinctly flattened. As will be seen in the figures (2 and 2*a*) the sexes present remarkable differences: in the ♀ the carapace is barely twice as broad as long, but in the ♂ its breadth is less than $1^1/_2$ times its length; besides in the former sex the carapace is more strongly vaulted quite anteriorly and its lateral margins are less acute than in the ♂. Gastric and cardiac region, separated by an obscure cervical groove, are more or less distinctly outlined by narrow, interrupted grooves; hepatic and branchial regions are incompletely separated, and the former presents two pits, placed in an oblique line, branchial regions scarcely declivous in their postero-lateral parts.

The front is faintly bilobed in dorsal view; its deflexed anterior margin is somewhat angular in facial view. The eye-stalks are short, slightly movable and much flattened: in dorsal aspect of the animal they look cylindrical, but broadly-oval or rather triangular in anterior view. Eyes are well developed, cornea rather large, chiefly on the ventral side of the peduncle, pigment black. Fronto-orbital distance in ♂ almost exactly one-half, in ♀ less than four-tenths, of greatest breadth of carapace. Lateral margins of carapace keeled, entire, not hairy and regularly curved, anteriorly much more so in ♀ than in ♂, owing to the proportionally much greater breadth of the carapace in the former. Posterior margin of carapace in ♀ concave, nearly $1^1/_2$ times the fronto-orbital distance; in ♂ this margin is straight and shorter than the distance between the tips of the eyes.

Antennulae small, somewhat obliquely-folded, separated by a narrow septum. Antennae short, standing in the orbital hiatus, flagellum very short in the ♀, made up of 2—3 joints only, longer in the ♂, in which it consists of about 7 joints and reaches to the lateral end of the orbit. Pterygostomian and subbranchial regions smooth and glabrous, the latter parts hairy only above bases of legs; a deep, hairless groove runs from the lateral ends of the very short, almost linear epistome laterally and backward, accompanying the postero-lateral margins

of the carapace and continued up to the coxopodites of the last pair of legs. Buccal cavity widening backward. External maxillipeds (fig. 2*b*) little gaping, broad, smooth; ischium trapezoid, with the hind border greatly oblique, longer than merus; suture between both joints transverse, somewhat curved; merus broader than long, with the external border greatly convex, anterior border concave; palp short, inserted at antero-external angle of merus, consisting of three small joints, placed end to end, subequal in length, but diminishing rapidly in breadth; exognath wholly exposed to view, only one-third as broad as ischium, narrowing towards tip, which does not reach as far forward as merus, flagellum distinct.

The chelipeds are robust, more so in the ♂ than in the ♀; in the former sex they are slightly unequal, the right being somewhat the larger. Meropodite short, unarmed, hairy along the edges, inner surface with a triangular facet, bordered by a brown stripe; wrist small, inner angle rounded; chela (fig. 2*c*) entirely smooth and glabrous, save for some short hairs at inner surface, resembling that of *Pinnixa*, palm longer than fingers, upper border rounded, basal part of inferior border keeled, fingers short, high, compressed, tips curved, not at all gaping, inner margins wavy and minutely crenulate.

Walking legs short, in the ♂ about equal in length to breadth of carapace, in ♀ much shorter, slightly hairy. The first three pairs are subequal in length, the last pair is only little shorter. Meropodite only twice as long as broad (fig. 2*d*), anterior and posterior margin somewhat convex, so that the greatest breadth is lying in the middle, posterior margin in its distal half with some short teeth; carpo- and propodite short, the latter but little longer than the former, not narrowed, at least in the ♀, towards its distal end, dactyli remarkably minute, even more so in the ♀ than in the ♂, immovable, slender and acutely pointed, not hairy.

The abdomen of both sexes consists of seven segments, clearly separated, and occupies in the ♀ completely, in the ♂ almost so, the space between the bases of the posterior pair of legs. The first segment of the abdomen of the ♂ is broader than the third and longer than the second segment; the following segments regularly decrease in width; the terminal joint is semi-elliptical, and there is a rather wide distance between the tip of the abdomen and the hind margin of the buccal cavity. Sternal trench of the abdomen not sharply marked anteriorly. The first abdominal appendages of the ♂ with the hairy tip curved inward, reaching nearly to end of abdomen. Abdomen of ♀ broad, segments regularly increasing in length from base to tip, entirely covering the sternum, fourth segment broadest. The whole ventral surface of the ♀ at hand is concealed beneath a compact mass of eggs, the diameter of which is about 0.3 mm.

The general colour of the species is ivory-white.

I am unable to place this new species into any one of the known genera; as has been already remarked it might, on superficial examination, especially in the case of the transverse ♀, easily be mistaken for a *Pinnixa*. Now H. Milne-Edwards described, as early as 1853, a species, *Pinnixa brevipes* [1]), from Madagascar, which is remarkable by the following features:

1) Ann. Sc. Nat. (3), t. 20, 1853, p. 220. The only additional reference to this species is given by A. Milne-Edwards (Nouv. Arch. Mus. Paris, t. 9, 1873, p. 320), who remarks: "the carapace est finement ponctuée et les pinces sont moins comprimées et moins granuleuses (viz. than in "*Pinnixa*" (= *Tetrias*) *fischeri*").

"pattes courtes et paraissant obtuses au bout, les dactylopodites étant rudimentaires". This may be perfectly applied to my new species, but unfortunately the diagnosis of *Pinnixa brevipes*, of which no figure exists, is very short, and the carapace presents a curved groove in his posterior third.

The species was found, ♂ and ♀ together, in the tube of a Terebellid (*Loimia*).

Dimensions in mm.:

	♂	♀
Fronto-orbital distance	3.85	4.2
Distance between bases of antennae	1.75	1.75
Breadth of carapace	7.8	11.25
Length of carapace	5.3	6.—
Posterior margin of carapace	3.2	6.4
Length of penultimate pair of legs	6.6	6.8
Length of last pair of legs	4.6	5.1

In the course of the present work I have frequently felt the need of a faunistic list of Indo-Pacific Pinnotheridae. For the help of any one, who chances to study collections of this family and who wishes to arrive at least to a provisional survey of the genera and species to be expected from some subregions of the Indo-Pacific, I append the following list.

Coast of California [1]:

Pinnotheres margarita S. J. Smith. Transact. Connecticut Ac., v. 2, 1870, p. 166.

Pinnotheres angelicus Lockington. Hab. Vera Cruz. See MIERS, Journ. Linn. Soc. London, v. 15, 1880, p. 86.

Pinnotheres pugettensis Holmes. Proc. Californ. Ac. Sc., v. 7, 1900, p. 86.

Pinnotheres nudus Holmes. See WEYMOUTH, Leland Stanford Jr. Univ. Publ. n° 4, 1910, p. 53, textfig. 1.

Pinnotheres trapeziformis (Nauck). Hab. Mazatlan. See BÜRGER, Zool. Jahrb., Syst., Bd 8, 1895, p. 380, pl. 9, f. 26, pl. 10, f. 25.

Raphonotus subquadratus (Dana). See WEYMOUTH, Leland Stanford Jr. Univ. Publ., n° 4. 1910, p. 54, textfig. 2.

Dissodactylus nitidus S. J. Smith. L. c., p. 173.

Scleroplax granulata Rathbun. See WEYMOUTH, l. c., p. 59, textfig. 8.

Cryptophrys concharum Rathbun. Proc. U. S. Nat. Mus., v. 16, 1893, p. 250.

Parapinnixa nitida Lockington, See HOLMES, l. c., p. 95.

Parapinnixa affinis Holmes. L. c., p. 95.

Pinnixa occidentalis Rathbun
Pinnixa californiensis Rathbun
Pinnixa faba (Dana)
Pinnixa tubicola Holmes
Pinnixa littoralis Holmes
Pinnixa longipes (Lockington)

} See WEYMOUTH, l. c., p. 55—59, textfigs. 3—7.

1) See especially HOLMES (Proc. Californ. Ac. Sc., v. 7, 1900) and WEYMOUTH (Leland Stanford Jr. Univ. Publ., n° 4, 1910).

Tetrias scabripes Rathbun. Proc. U. S. Nat. Mus., v. 21, 1899, p. 608, pl. 43, f. 12—14.
Opisthopus transversus Rathbun. See Weymouth, l. c., p. 61, textfig. 9.

Coast of Panama and adjacent regions:

Pinnotheres margarita S. J. Smith. See above.
Pinnotheres lithodomi S. J. Smith. L. c., p. 169.
Dissodactylus nitidus S. J. Smith. See above.
Pinnixa affinis Rathbun. Proc. U. S. Nat. Mus., v. 21, 1899, p. 606, pl. 43, f. 7—9.
Pinnixa panamensis Faxon. Bull. Mus. comp. Zool. Harvard Coll., v. 24, 1893, p. 158.

West coast of South America [1]**:**

Pinnotheres margarita S. J. Smith. See above.
Pinnotheres silvestrii Nobili. Boll. Mus. Torino, v. 16, 1901, n° 402, p. 21.
Pinnotheres bipunctatum Nicolet. Gay, Hist. Chile, Zool., v. 3, 1849, p. 155, pl. 1, f. 2.
Pinnaxodes chilensis (H. Milne-Edwards). See S. J. Smith, l. c., p. 170.
Pinnaxodes hirtipes Heller. See Rathbun, Proc. U. S. Nat. Mus., v. 21, 1899, p. 607, pl. 43, f. 10—11.
Pinnaxodes meinerti Rathbun. Proc. Biol. Soc. Washington, v. 17, 1904, p. 162.
Ostracotheres politus S. J. Smith. See Lenz, Zool. Jahrb., Syst., Supplementbd. 5, 1902, p. 765, pl. 23, fig. 9; Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 545, pl. 43, f. 3.
Dissodactylus nitidus S. J. Smith. See above. Also: Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 545, pl. 48, f. 6.
Pinnotherelia laevigata H. Milne-Edwards. See Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 51, f. 3.
Pinnixa transversalis (H. Milne-Edwards et Lucas). See Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 46, f. 1.
Pinnixa valdiviensis Rathbun. Revista Chilena Hist. Nat., v. 11, 1907, p. 45, pl. 3, f. 2—3, textfig. 1.

Coasts of Japan and neighbourhood of Hongkong:

Pinnaxodes major Ortmann. Hab. Japan. Zool. Jahrb., Syst., Bd 7, 1894, p. 697, pl. 23, f. 10.
Pinnotheres pholadis de Haan. Hab. Japan. (= *P. pisoides* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 698, pl. 23, f. 11).
Pinnotheres parvulus Stimpson. Hab. Japan and China Sea. See Rathbun, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 331, pl. 2, f. 9, textfig. 13.
Pinnotheres obscurus Stimpson. Hab. Hongkong. See Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 141.
Pinnotheres boninensis Stimpson. Hab. Bonin Islands. L. c., p. 141.
Pinnixa tumida Stimpson. Hab. Japan. L. c., p. 143.
Pinnixa penultipedalis Stimpson. Hab. Hongkong and Japan. See Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 695, pl. 23, f. 7.

1) See Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 587—588.

Pseudopinnixa carinata Ortmann. Hab. Japan. L. c., p. 694, pl. 23, f. 6.
Tritodynamia japonica Ortmann. Hab. Japan. L. c., p. 693, pl. 23, f. 5.
Tritodynamia horváthi Nobili. Hab. Japan. Ann. Mus. Hung., v. 3, 1905, p. 407, pl. 10, f. 1.
Asthenognathus inaequipes Stimpson. Hab. Japan. See DE MAN, Transact. Linn. Soc. London (2), v. 9, 1907, p. 392, pl. 31, f. 4—6.
Xenophthalmus pinnotheroides White. Hab. Hongkong. See the present paper, p. 272.

Red Sea (and Persian Gulf) [1]:

Pinnotheres perezi Nobili. Hab. Persian Gulf. See NOBILI, Bull. scient. France et Belgique, t. 40, 1906, p. 147, pl. 5, f. 25.
Pinnotheres pectinicolus Bürger. Zool. Jahrb., Syst., Bd 8, 1895, p. 365, pl. 9, f. 1, pl. 10, f. 1.
Pinnotheres purpureus Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 339; Ill. Zool. "Investigator", Crust. prt 10, 1903, pl. 62, f. 6.
Pinnotheres pernicolus Bürger. L. c., p. 375, pl. 9, f. 17, pl. 10, f. 16.
Pinnotheres lutescens Nobili. Ann. Sc. Nat. (9), t. 4, 1906, p. 304, textfig. 10.
Pinnotheres coutieri Nobili. L. c., p. 305, textfig. 10 (err. typ.).
Pinnotheres borradailei Nobili (= *P. tenuipes* Borradaile, Faun. Geogr. Maldive and Laccadive Arch., v. 1, 1903, p. 431, textfig. 113).
Pinnotheres maindroni Nobili. L. c., p. 306, pl. 8, f. 8, textfig. 11.
Pinnotheres pilumnoides Nobili. L. c., p. 307, textfig. 12.
Ostracotheres tridacnae Rüppell. See H. MILNE-EDWARDS, Ann. Sc. Nat. (3), t. 20, 1853, p. 219, pl. 11, f. 10.
Ostracotheres affinis H. Milne-Edwards. L. c., p. 220, pl. 11, f. 11 (err. typ.: 5).
Ostracotheres cynthiae Nobili. See LAURIE, Journ. Linn. Soc. London, v. 31, 1915, p. 465, pl. 45, f. 3. Also in the present paper p. 263.
Ostracotheres spondyli Nobili. Hab. Persian Gulf. Bull. Mus. Paris, t. 11, 1905, p. 164.
Dürckheimia carinipes de Man. Zool. Jahrb., Syst., Bd. 4, 1889, p. 442, pl. 10, f. 12.

Coasts of Australia and New Zealand:

Pinnotheres pisum Linné. Hab. New Zealand. See ADENSAMER, Ann. Hofmus. Wien, Bd. 12, 1897, p. 106; BORRADAILE, British Antarctic ("Terra Nova") Exp. 1910, Zool., v. 3, n° 2, 1916, p. 100, textfig. 12.
Pinnotheres novae-zealandiae Filhol. Hab. New Zealand. See LENZ, Zool. Jahrb., Syst., Bd. 14, 1900, p. 467, pl. 32, f. 11—14.
Pinnotheres schauinslandi Lenz. Hab. New Zealand. L. c., p. 468, pl. 32, f. 15—18.
Ostracotheres (?) ("*Pinnotheres*") *holothuriensis* Baker. Hab. South Australia. Transact. Roy. Soc. South Australia, Adelaide, v. 31, 1908, p. 177, pl. 23, f. 3.
Ostracotheres (?) ("*Pinnotheres*") *subglobosus* Baker. Hab. South Australia. L. c., p. 179.

1) See NOBILI, Ann. Sc. Nat. (9), t. 4, 1906.

LIST OF THE STATIONS,

WHENCE SPECIES OF THE FAMILIES GONEPLACIDAE AND PINNOTHERIDAE WERE OBTAINED.

STATION 2. Madura Strait. Depth 56 m. *Homoioplax haswelli* (Miers) Rathbun.

STATION 4. Djangkar, East Java. Depth 9 m. *Xenophthalmodes dolichophallus* n. sp., *Xenophthalmus pinnotheroides* White.

STATION 5. 7°46′ S., 114°30′.5 E. Near north-east point of Java. Depth 330 m. *Camatopsis rubida* Alcock.

STATION 12. 7°15′ S., 115°15.6 E. North of Bali. Depth 289 m. *Hexaplax megalops* Doflein.

STATION 19. Bay of Labuan Tring, west coast of Lombok. Depth 18—27 m. *Scalopidia spinosipes* Stimpson.

STATION 34. Bay of Labuan Pandan, east coast of Lombok. Depth 18 m. *Litocheira setosa* (A. Milne-Edwards), *Pinnotheres quadratus* Rathbun.

STATION 37. Sailus Ketjil, Paternoster Islands. Depth up to 27 m. *Hexapus sexpes* (Fabricius).

STATION 38. 7°35′.4 S., 117°28′.6 E. North of Paternoster Islands. Depth 521 m. [1]). *Psopheticus stridulans* Wood-Mason.

STATION 47. Bay of Bima, north coast of Sumbawa. Depth 55 m. *Typhlocarcinops transversa* n. sp., *Notonyx nitidus* A. Milne-Edwards.

STATION 51. Madura Bay, west coast of Flores. Depth 54—90 m. *Litocheira sculptimana* n. sp., *Notonyx vitreus* Alcock, *Xenophthalmodes dolichophallus* n. sp., *Typhlocarcinodes hirsutus* (Borradaile).

STATION 53. Bay of Nangamessi, Sumba. Depth up to 36 m. *Litocheira setosa* (A. Milne-Edwards), *Litocheira quadrispinosa* Zehntner, *Typhlocarcinus villosus* Stimpson, *Pinnotheres latus* Bürger.

STATION 66. Saleyer Island, south of Celebes. Depth 8—10 m. *Litocheira affinis* n. sp.

STATION 71. Macassar. Depth up to 32 m. *Typhlocarcinus nudus* Stimpson, *Scalopidia spinosipes* Stimpson.

STATION 77. Borneo Bank. Depth 59 m. *Lophoplax bicristata* n. g. n. sp.

STATION 114. Kwandang Bay, north coast of Celebes. Depth 75 m. *Eucrate sulcatifrons* (Stimpson), *Camatopsis rubida* Alcock.

STATION 115. Kwandang Bay, north coast of Celebes. Depth 31 m. *Chasmocarcinops gelasimoides* Alcock.

STATION 116. West of Kwandang Bay, north coast of Celebes. Depth 72 m. *Catoptrus inaequalis* Rathbun, *Speocarcinus celebensis* n. sp., *Camatopsis rubida* Alcock.

1) According to List of Stations.

STATION 127. Taruna Bay, Great Sangir Island. Depth 45 m. *Litocheira setosa* (A. Milne-Edwards).

STATION 131. Karakelang, Talaut Islands. Reef. *Litocheira quadrispinosa* Zehntner.

STATION 133. Lirung, Talaut Islands. Depth up to 36 m. *Typhlocarcinops decrescens* Rathbun, *Typhlocarcinops angustipes* n. sp., *Typhlocarcinodes piroculatus* (Rathbun).

STATION 139. 0° 11′ S., 127° 25′ E. Between Kajoa Island and Batjan. Depth 397 m. *Pilumnoplax abyssicola* Miers.

STATION 144. Salomakiëe, near south point of Halmaheira. Depth 45 m. *Litocheira aranea* n. sp., *Catoptrus nitidus* A. Milne-Edwards.

STATION 152. Wunoh Bay, north-west coast of Waigeu Island. Depth 32 m. *Pinnotheres quadratus* Rathbun.

STATION 153. 0° 3′.8 N., 130° 24′.3 E., near north-west point of Waigeu Island. Depth 141 m. *Litocheira subintegra* Lanchester.

STATION 154. 0° 7′.2 N., 130° 25′.5 E., north of Waigeu Island. Depth 59—83 m. *Catoptrus nitidus* A. Milne-Edwards.

STATION 162. West coast of Salawatti. Depth 18 m. *Eucrate sulcatifrons* (Stimpson), *Ceratoplax ciliata* Stimpson.

STATION 164. South of Salawatti, near north-west New Guinea. Depth 32 m. *Notonyx vitreus* Alcock.

STATION 172. Between Gisser and Ceram-Laut. Depth 18 m. Reef. *Pinnotheres onychodactylus* n. sp.

STATION 174. Waru Bay, north-east coast of Ceram. Depth 18 m. *Typhlocarcinus nudus* Stimpson, *Hephthopelta littoralis* n. sp., *Pinnotheres obesus* (Dana).

STATION 181. Amboyna. Depth 36—54 m. *Litocheira setosa* (A. Milne-Edwards), *Goneplax sinuatifrons* Miers, *Notonyx nitidus* A. Milne-Edwards, *Tetrias fischeri* (A. Milne-Edwards).

STATION 193. Sanana Bay, east coast of Sula Besi, E. of Celebes. Reef. *Litocheira quadrispinosa* Zehntner, *Ceratoplax truncatifrons* Rathbun.

STATION 204. Between Wowoni and Buton Island, S. of Celebes. Depth 75—94 m. *Goneplax maldivensis* Rathbun.

STATION 205. Lohio Bay, Buton Strait, S. of Celebes. Depth 22 m. *Xenophthalmodes dolichophallus* n. sp.

STATION 212. 5° 54′.5 S., 120° 19′.2 E. W. of Saleyer Island. Depth 462 m. *Hexaplax megalops* Doflein.

STATION 213. Saleyer Island, S. of Celebes. Depth up to 36 m. *Chasmocarcinops gelasimoides* Alcock.

STATION 225c. Lucipara Islands, Banda Sea. Reef. *Typhlocarcinodes crassipes* n. sp.

STATION 240. Banda. Depth 9—45 m. *Litocheira setosa* (A. Milne-Edwards).

STATION 248. Tiur Island, between Ceram and Kei Islands. Reef. *Litocheira quadrispinosa* Zehntner.

STATION 250. Kur, Kei Islands. Depth 20—45 m. *Litocheira aranea* n. sp.

STATION 254. 5° 40′ S., 132° 36′ E. W. of Kei Islands. Depth 310 m. *Camatopsis rubida* Alcock.

STATION 258. Tual, Kei Islands. Depth 22 m. *Paraselwynia ursina* n. g. n. sp., *Hexapus sexpes* (Fabricius), *Pinnotheres edwardsi* de Man, *Ostracotheres cynthiae* Nobili.

STATION 260. 5° 36′.5 S., 132° 55′.2 E. N. W. of Kei Islands. Depth 90 m. *Litocheira sculptimana* n. sp., *Ommatocarcinus orientalis* n. sp., *Lophoplax bicristata* n. g. n. sp., *Camatopsis rubida* Alcock.

STATION 261. Elat, Great Kei Island. Depth 27 m. *Pinnotheres villosulus* Guérin, *Pinnotheres trichopus* n. sp.

STATION 266. 5° 56′.5 S., 132° 47′.7 E. S. E. of Kei Islands. Depth 595 m. *Pilumnoplax abyssicola* Miers.

STATION 267. 5° 54′ S., 132° 56′.7 E. S. E. of Kei Islands. Depth 984 m. *Pilumnoplax abyssicola* Miers.

STATION 273. Pulu Jedan, east coast of Aru Islands. Depth 13 m. *Mertonia lanka* Laurie.

STATION 274. 5° 28′.2 S., 134° 53′.9 E. N. of Aru Islands. Depth 57 m. *Typhlocarcinops angustipes* n. sp.

STATION 277. Dammer Island, N. E. of Timor. Depth 40 m. *Pinnotheres consors* Bürger.

STATION 279. Roma Island, N. of Timor. Depth 36 m. *Typhlocarcinops decrescens* Rathbun.

STATION 285. S. E. coast of Timor. Depth 34 m. *Litocheira aranea* n. sp., *Typhlocarcinus villosus* Stimpson, *Notonyx nitidus* A. Milne-Edwards.

STATION 302. 10° 27′.9 S., 123° 28′.7 E. Near Rotti. Depth 216 m. *Camatopsis rubida* Alcock.

STATION 303. Haingsisi, Samau Island, S. W. of Timor. Depth up to 36 m. *Eucrate sulcatifrons* (Stimpson).

STATION 306. 8° 27′ S., 122° 54′.5 E. S. of Flores. Depth 247 m. *Camatopsis rubida* Alcock.

STATION 311. Sapeh Bay, east coast of Sumbawa. Depth up to 36 m. *Xenophthalmus pinnotheroides* White.

STATION 312. Saleh Bay, north coast of Sumbawa. Depth 274 m. *Camatopsis rubida* Alcock.

STATION 313. Saleh Bay, north coast of Sumbawa. Depth up to 36 m. *Aphanodactylus sibogae* n. g. n. sp.

STATION 315. Sailus Besar, Paternoster Islands. Depth up to 36 m. *Litocheira affinis* n. sp.

CORRIGENDA.

P. 165 line 16 from top read Pl. 7 instead of Pl. 1.
P. 167 line 11 from top read Pl. 7 instead of Pl. 1.
P. 168 line 3 from bottom read Pl. 7 instead of Pl. 1.
P. 171 line 17 from bottom read Pl. 8 instead of Pl. 2.

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Note. — Synonyms are printed in Italics. The more important pages are indicated by heavier type.

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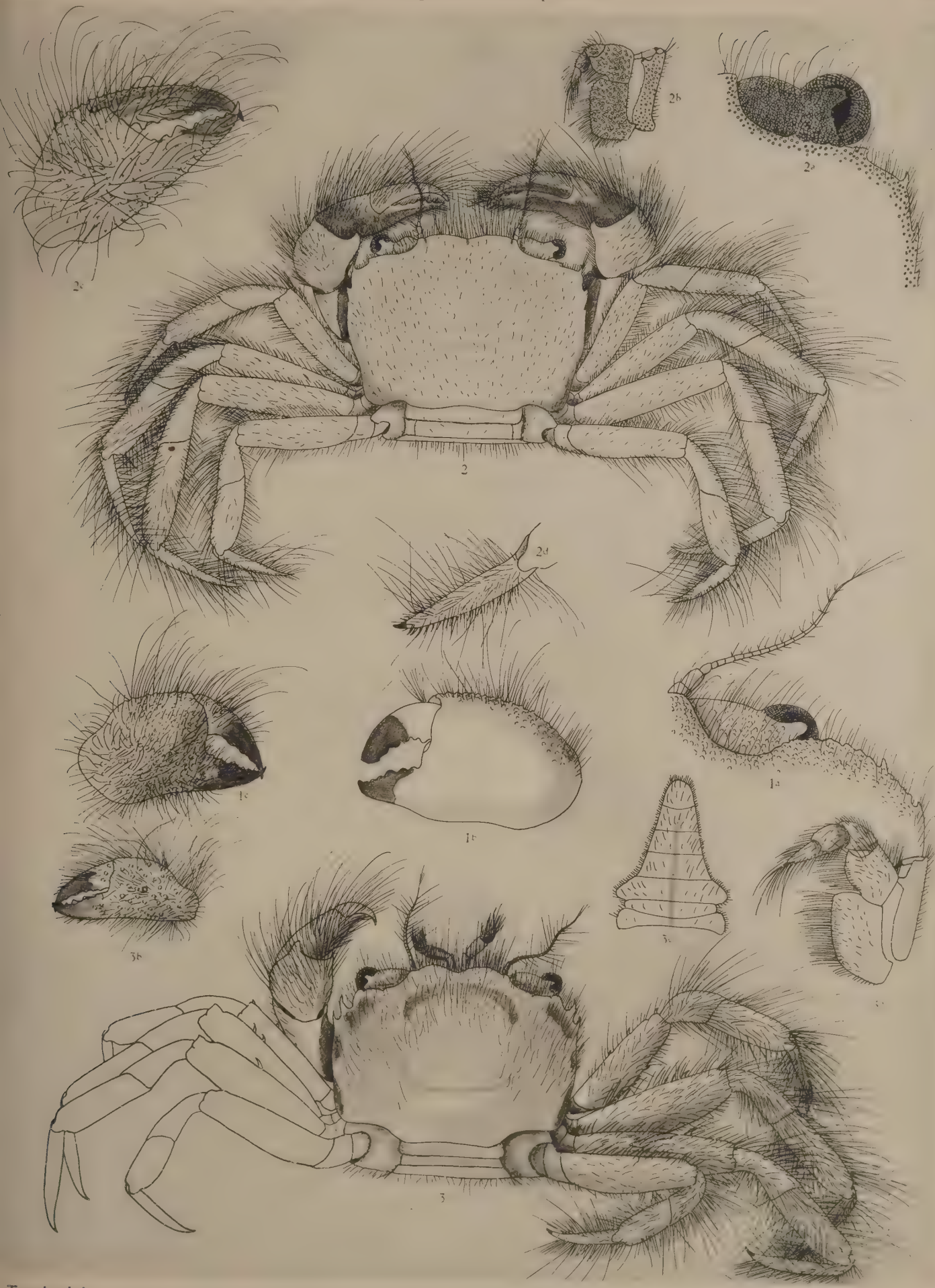
PLATE VII.

Fig. 1*a*. *Litocheira setosa* (A. Milne-Edwards), antero-lateral part of carapace, magn. 15. Fig. 1*b* left chela of ♂, outer view, magn. 10. Fig. 1*c* right chela of ♂, outer view, magn. 10.

Fig. 2. *Litocheira affinis* n. sp., ♂, magn. 10. Fig. 2*a* antero-lateral part of carapace, magn. 25. Fig. 2*b* external maxilliped, magn. 15. Fig. 2*c* right chela of ♂, outer view, magn. 15. Fig. 2*d* dactylus of last right leg, magn. 20.

Fig. 3. *Litocheira quadrispinosa* Zehntner, ♂, magn. 10. Fig. 3*a* external maxilliped, magn. 20. Fig. 3*b* left chela of ♂, outer view, magn. 10. Fig. 3*c* abdomen of ♂, magn. 10.



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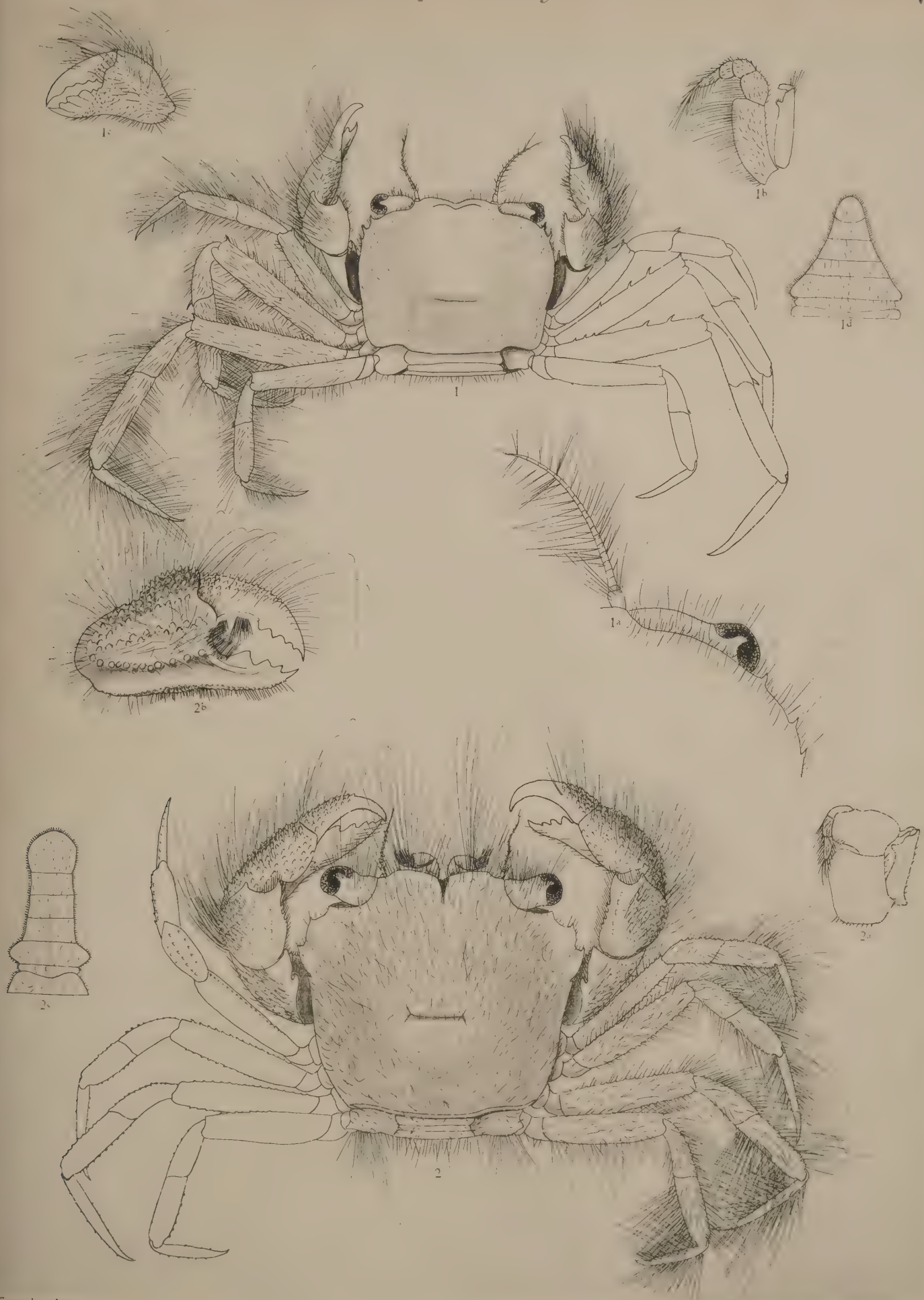
1. Litocheira setosa A. Milne-Edwards. 2. Litocheira affinis n.sp

PLATE VIII.

Fig. 1. *Litocheira aranea* n. sp., ♂, magn. 10. Fig. 1*a* antero-lateral part of carapace (of ♀ of Stat. 285), magn. 20. Fig. 1*b* external maxilliped, magn. 20. Fig. 1*c* left chela of ♂, outer view, magn. 10 Fig. 1*d* abdomen of ♂, magn. 10.

Fig. 2. *Litocheira sculptimana* n. sp., ♂, magn. 15. Fig. 2*a* external maxilliped, magn. 15. Fig. 2*b* right chela of ♂, outer view, magn. 15. Fig. 2*c* abdomen of ♂, magn. 15.



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1. Litocheira aranea n.sp.

2. Litocheira sculptimana n.sp

PLATE IX.

Fig. 1. *Goneplax maldivensis* Rathbun, ♂, magn. 10. Fig. 1*a* external maxilliped, magn. 20. Fig. 1*b* right chela of ♂, outer view, magn. 20. Fig. 1*c* three last joints of posterior right leg, magn. 20. Fig. 1*d* abdomen of ♂, magn. 10.

Fig. 2*a*. *Goneplax sinuatifrons* Miers, abdomen of ♂, magn. 10.

Fig. 3. *Hephthopelta littoralis* n. sp., ♀, magn. 6. Fig. 3*a* cephalothorax, ventral view, magn. 10.

Fig. 4. *Catoptrus nitidus* A. Milne-Edwards, carapace, magn. 5. Fig. 4*a* frontal and antero-lateral margin of carapace, magn. 10. Fig. 4*b* external maxilliped, magn. 15. Fig. 4*c* first maxilliped, magn. 20. Fig. 4*d* right chela of ♂, outer view, magn. 5.

Fig. 5. *Catoptrus inaequalis* Rathbun, carapace, magn. 5. Fig. 5*a* frontal and antero-lateral margin of carapace, magn. 10. Fig. 5*b* external maxilliped, magn. 15. Fig. 5*c* left chela of ♀, outer view, magn. 5.

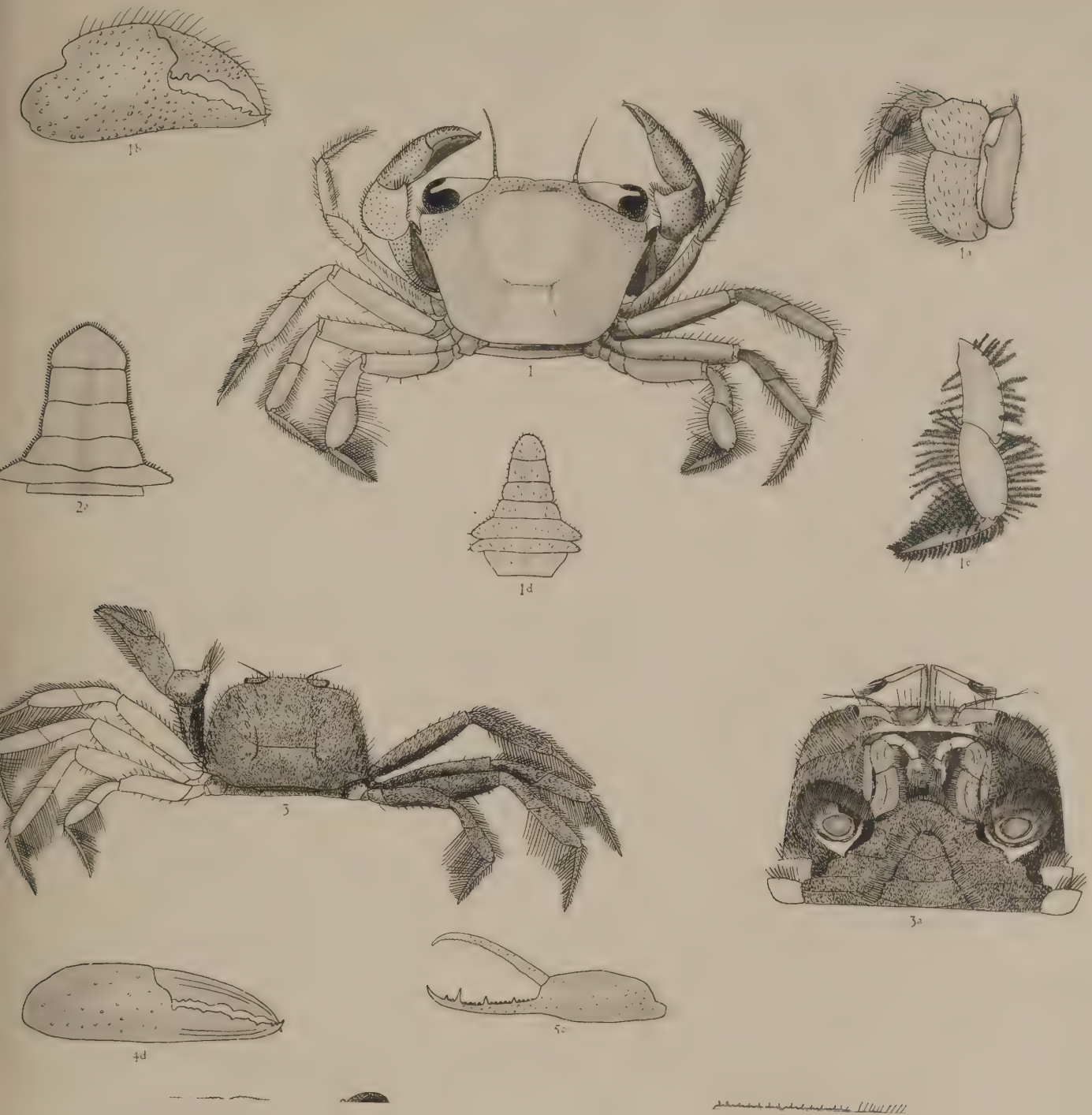
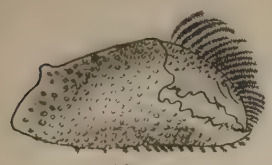

1b
1
1a
2b
1d
1c
3
3a
4d
5c

PLATE X.

Fig. 1. *Homoioplax haswelli* (Miers) Rathbun, ♂, magn. 8. Fig. 1*a* right chela of ♂, outer view, magn. 8. Fig. 1*b* dactylus of last leg, magn. 25. Fig. 1*c* abdomen of ♂, magn. 10.

Fig. 2. *Ommatocarcinus orientalis* n. sp., ♂, magn. 10. Fig. 2*a* ventral view of carapace, magn. 20. Fig. 2*b* outline of front, anterior view, magn. 20. Fig. 2*c* external maxilliped, magn. 30. Fig. 2*d* right cheliped of ♂, outer view, magn. 10. Fig. 2*e* abdomen of ♂, inner view, magn. 20.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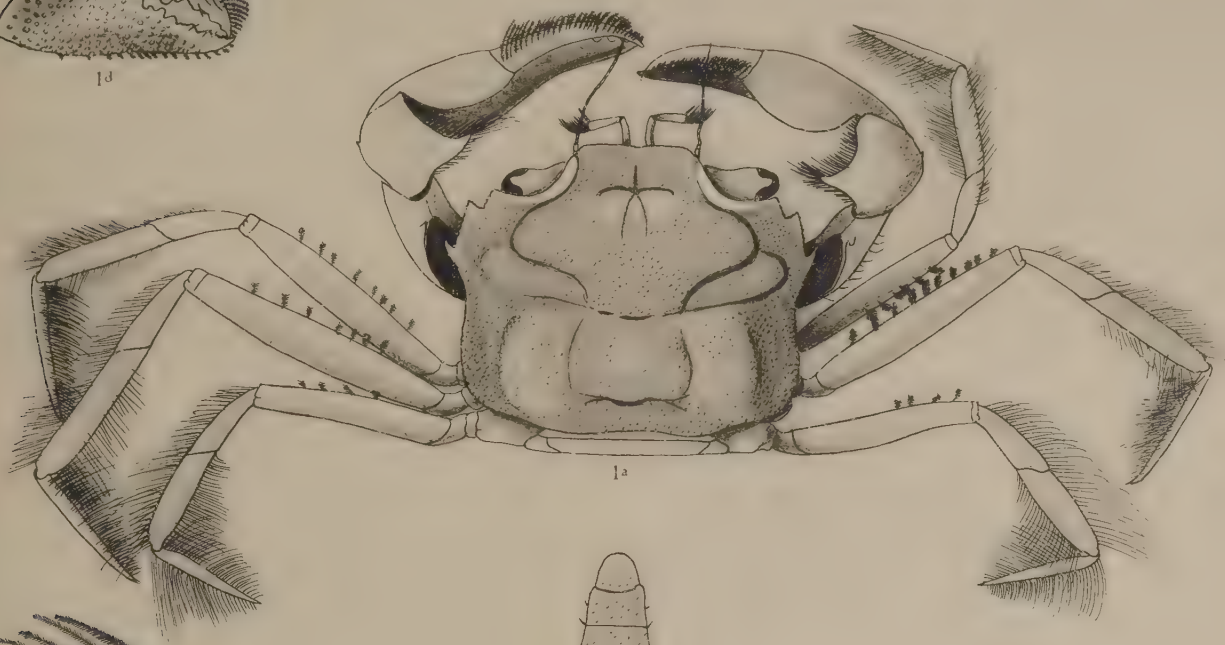
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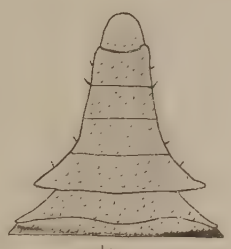
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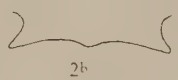
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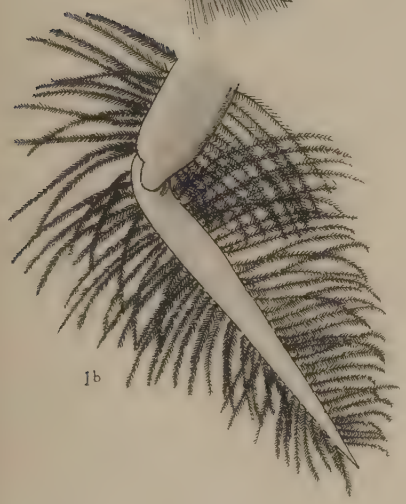
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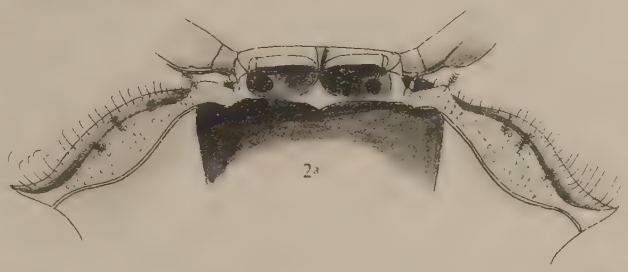
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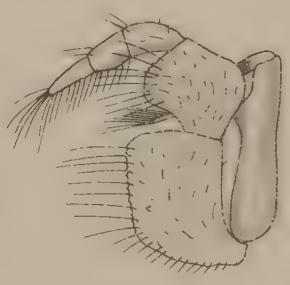
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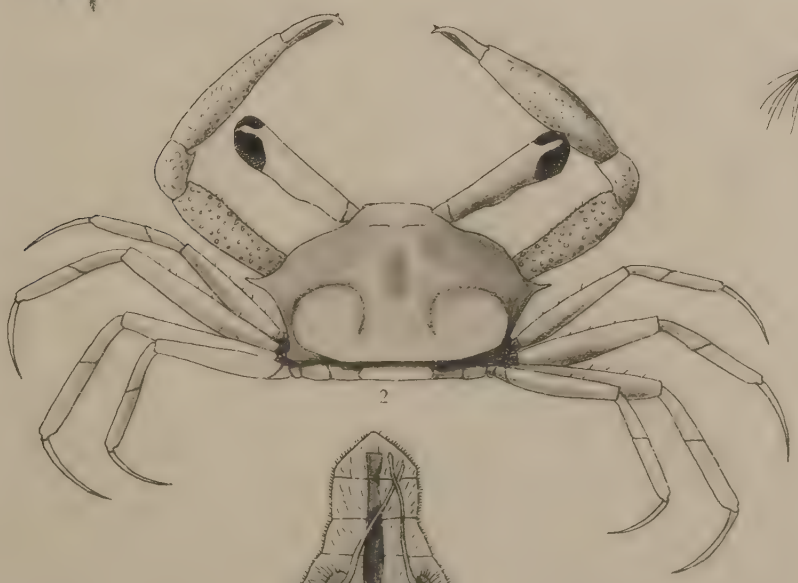
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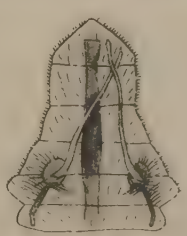
2e

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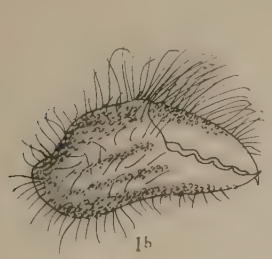
1. Homoioplax haswelli (Miers) Rathbun.

2. Ommatocarcinus orientalis n. sp.

PLATE XI.

Fig. 1. *Speocarcinus celebensis* n. sp., ♂, magn. 10. Fig. 1*a* external maxilliped, magn. 20. Fig. 1*b* right chela of ♂, outer view, magn. 15. Fig. 1*c* abdomen of ♂, magn. 10.

Fig. 2. *Ceratoplax ciliata* Stimpson, ♂, magn. 3. Fig. 2*a* cephalothorax, anterior view, magn. 5. Fig. 2*b* right chela of ♂, (hairs removed), outer view, magn. $3^1/_2$. Fig. 2*c* abdomen of ♂, magn. 4.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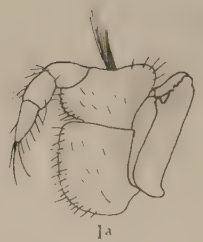
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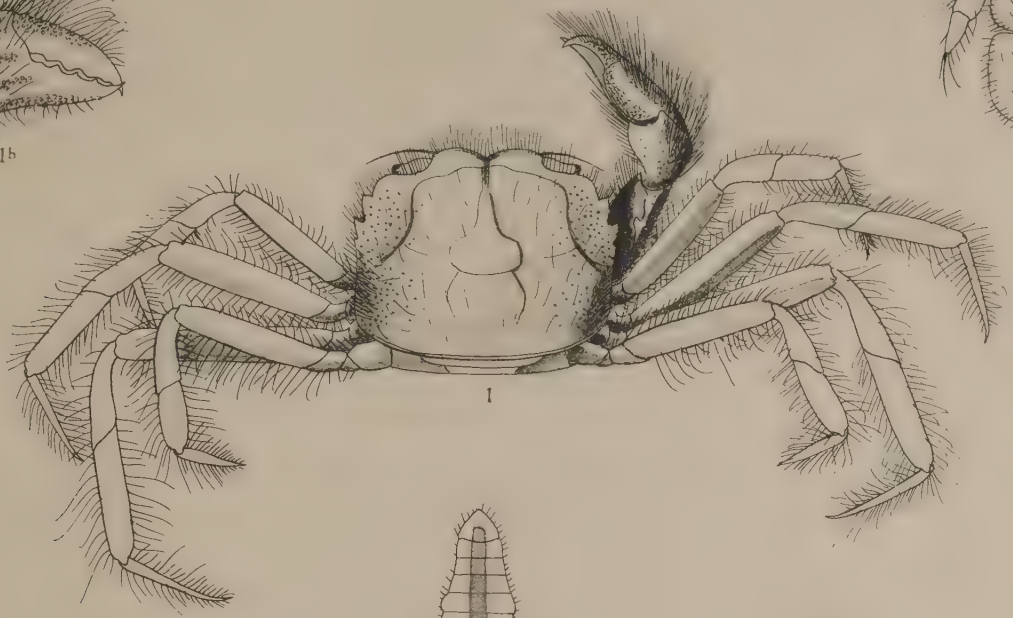
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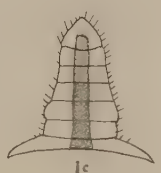
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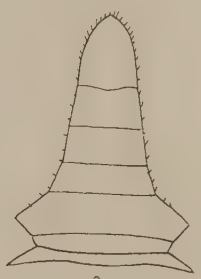
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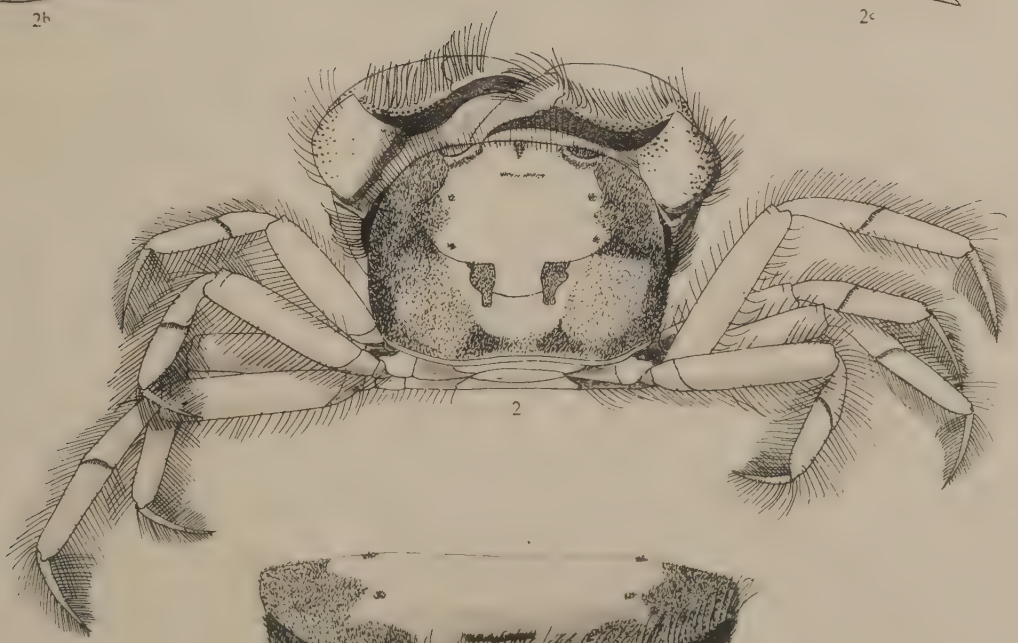
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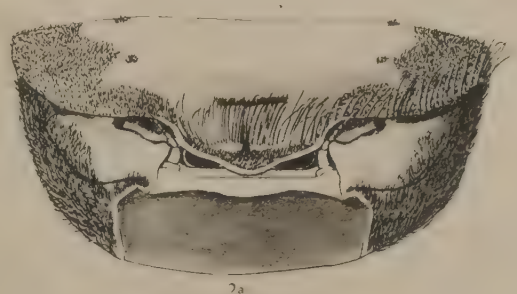
2a

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1. Speocarcinus celebensis n. sp.

2. Ceratoplax ciliata Stimpson.

PLATE XII.

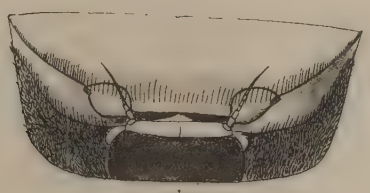
Fig. 1. *Ceratoplax truncatifrons* Rathbun, ♂, magn. 10. Fig. 1*a* cephalothorax, anterior view, magn. 10. Fig. 1*b* external maxilliped, magn. 20. Fig. 1*c* left chela of ♂, outer view, magn. 10. Fig. 1*d* right chela of ♂, outer view, magn. 10. Fig. 1*e* abdomen of ♂, magn. 10.

Fig. 2. *Lophoplax bicristata* n. g. n. sp., ♂, magn. 8. Fig. 2*a* external maxilliped, magn. 15. Fig. 2*b* abdomen of ♂, magn. 8.

1

1b

1d



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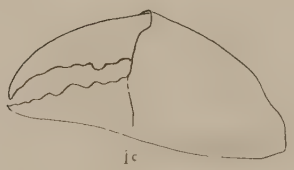

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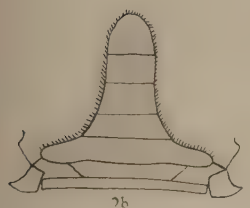
1e



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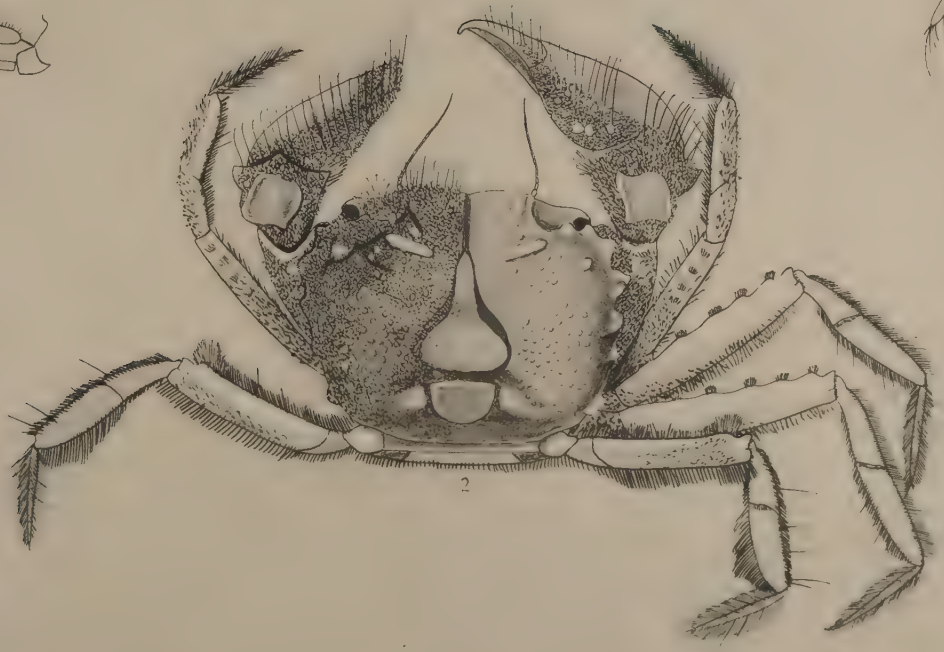
2a



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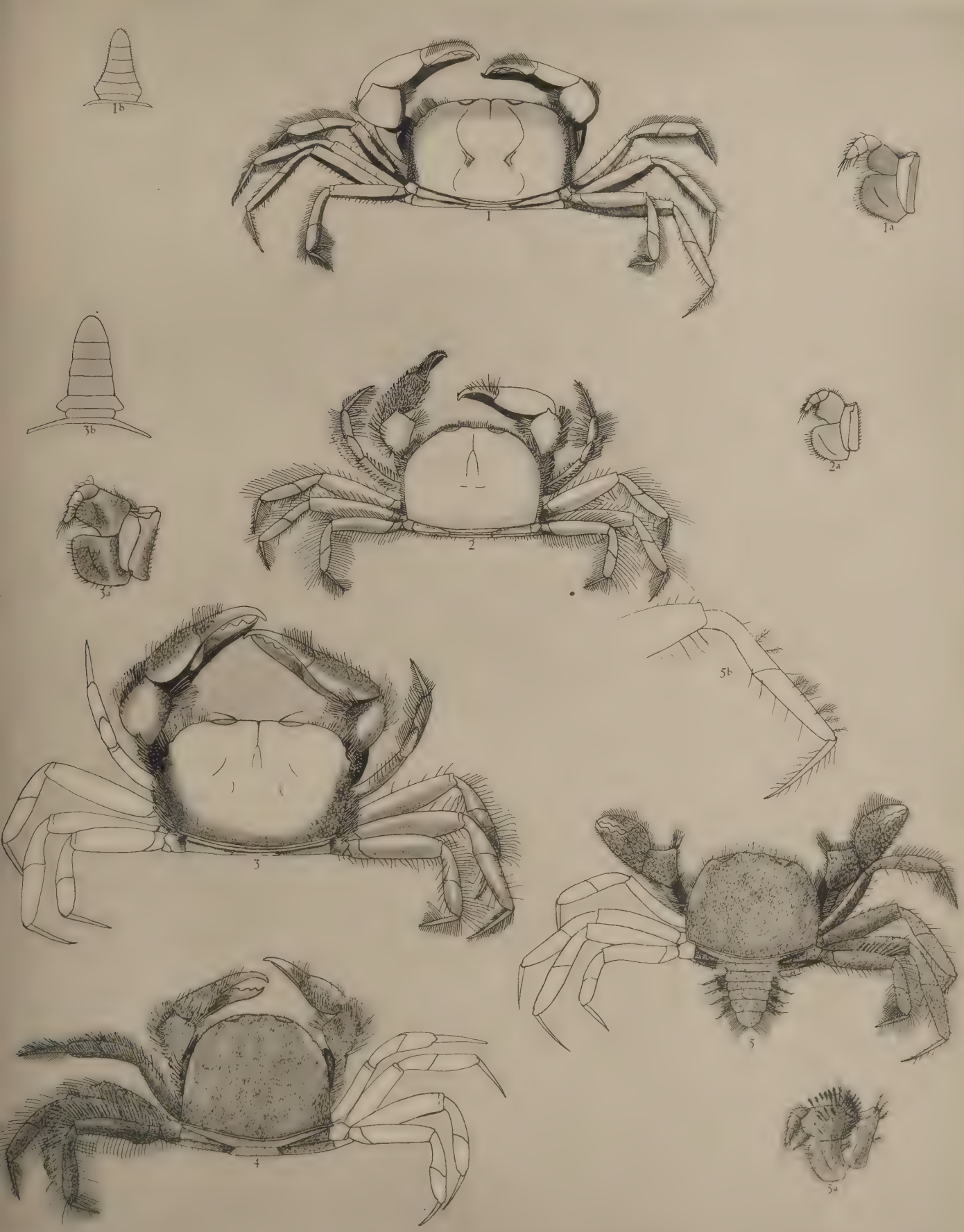
J. Tesch, del.

1. Ceratoplax truncatifrons Rathbun.

2. Lophoplax bicristata n. g. n. sp.

PLATE XIII.

Fig. 1. *Typhlocarcinus nudus* Stimpson, ♂, magn. 5. Fig. 1*a* external maxilliped, magn. 10. Fig. 1*b* abdomen of ♂, magn. 5.
Fig. 2. *Typhlocarcinus villosus* Stimpson, ♂, magn. 5. Fig. 2*a* external maxilliped, magn. 10.
Fig. 3. *Typhlocarcinops transversa* n. sp., ♂, magn. 5. Fig. 3*a* external maxilliped, magn. 10. Fig. 3*b* abdomen of ♂, magn. 5.
Fig. 4. *Typhlocarcinops decrescens* Rathbun, ♀, magn. 5.
Fig. 5. *Typhlocarcinops angustipes* n. sp., ♀, magn. 5. Fig. 5*a* external maxilliped, magn. 10. Fig. 5*b* right penultimate leg, magn. 10.



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1. Typhlocarcinus nudus Stimpson.
2. Typhlocarcinus villosus Stimpson.
3. Typhlocarcinops transversa n. sp.
4. Typhlocarcinops decrescens Rathbun.

PLATE XIV.

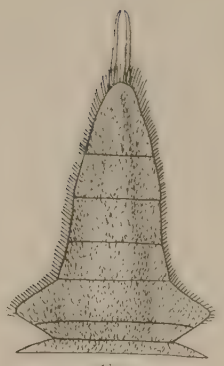
Fig. 1. *Xenophthalmodes dolichophallus* n. sp., ♂, magn. 5. Fig. 1*a* external maxilliped, magn. 10. Fig. 1*b* abdomen of ♂, magn. 10.

Fig. 2. *Paraselwynia ursina* n. g. n. sp., ♀, magn. 4. Fig. 2*a* external maxilliped, magn. 10. Fig. 2*b* left chela of ♀, outer view, magn. 4.

Fig. 3. *Scalopidia spinosipes* Stimpson, ♂, magn. 2. Fig. 3*a* cephalothorax, front view, magn. 2. Fig. 3*b* external maxillipeds, magn. 4. Fig. 3*c* right chela of ♂, outer view, magn. 2. Fig. 3*d* left chela of ♂, outer view, magn. 2. Fig. 3*e* abdomen of ♂, magn. 3.

1a

1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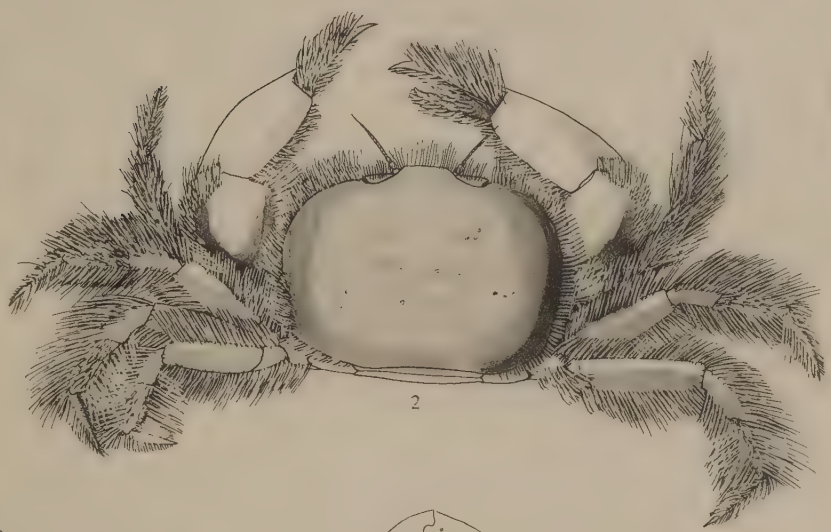
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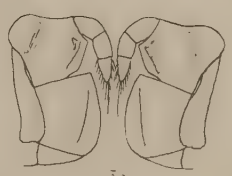
2b


3c

3c

3d

3a

3

3e

J. Tesch, del.

1. Xenophthalmodes dolichophallus n. sp.

2. Paraselwynia ursina n. g. n. sp.

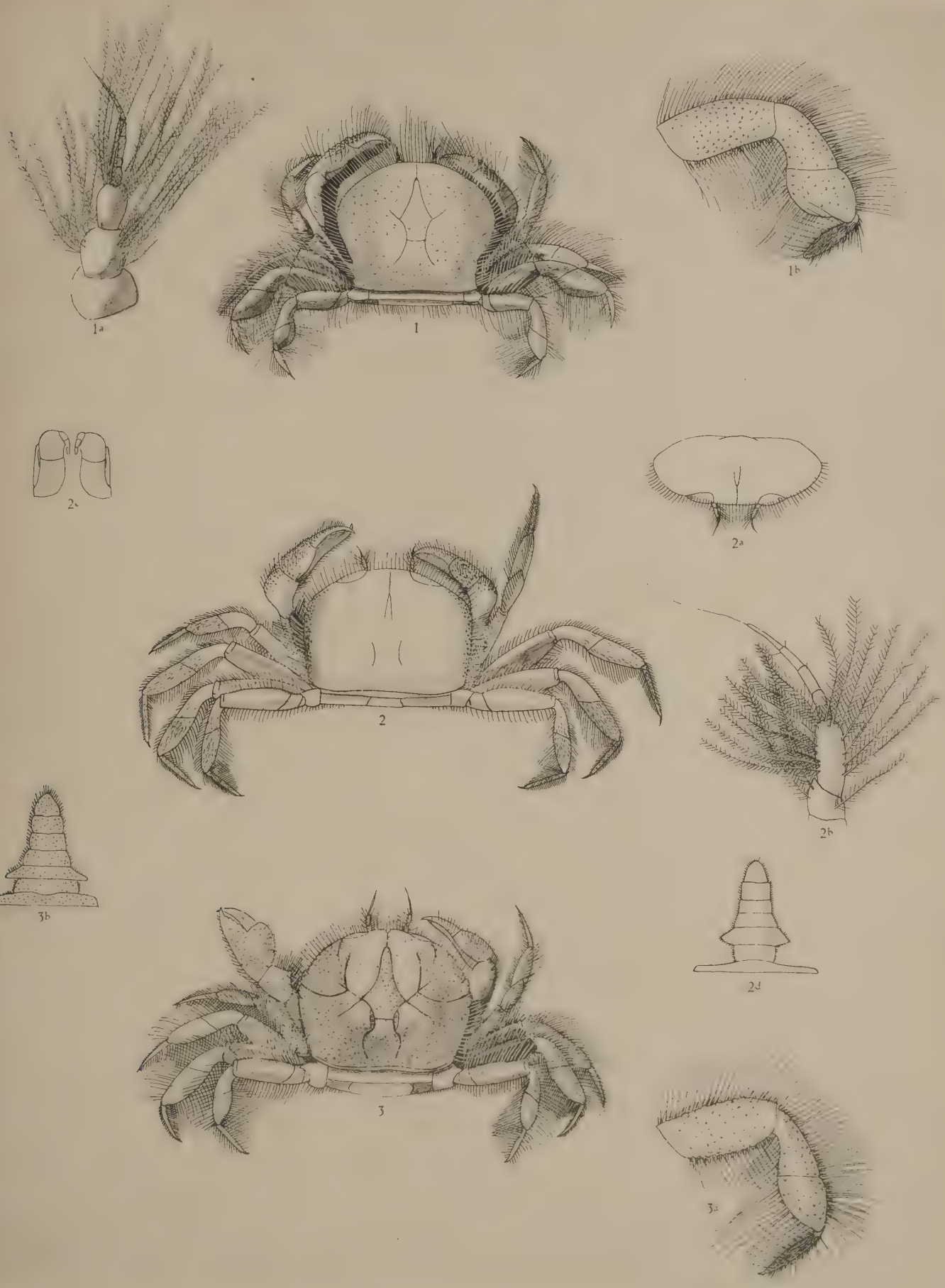
3. Scalopidia spinosipes Stimpson.

PLATE XV.

Fig. 1. *Typhlocarcinodes crassipes* n. sp., ♀, magn. 4. Fig. 1*a* left antenna, ventral view, magn. 30. Fig. 1*b* right last leg, magn. 10.

Fig. 2. *Typhlocarcinodes piroculatus* (Rathbun), ♂, magn. 7. Fig. 2*a* carapace, front view, magn. 7. Fig. 2*b* left antenna, ventral view, magn. 40. Fig. 2*c* external maxillipeds, magn. 10. Fig. 2*d* abdomen of ♂, magn. 7.

Fig. 3. *Typhlocarcinodes hirsutus* (Borradaile), ♂, magn. 5. Fig. 3*a* right last leg, magn. 10. Fig. 3*b* abdomen of ♂, magn. 5.



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1. Typhlocarcinodes crassipes n. sp.
2. Typhlocarcinodes piroculatus (Rathbun).
3. Typhlocarcinodes hirsutus (Borradaile).

PLATE XVI.

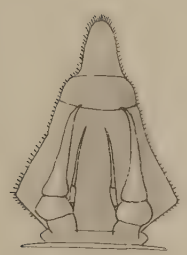
Fig. 1. *Litocheira subintegra* Lanchester, ♂, magn. 10.

Fig. 2*a*. *Mertonia lanka* Laurie, antenna, magn. 30.

Fig. 3. *Camatopsis rubida* Alcock, ♀, "forma A" (specimen of Stat. 5), magn. 2. Fig. 3*a* carapace of ♂, "forma A" (specimen of Stat. 306), seen obliquely in dorsal and in facial view, magn. 5. Fig. 3*b* external maxilliped, "forma A", magn. 5. Fig. 3*c* left chela of ♂, "forma A", outer view, magn. 5. Fig. 3*d* abdomen of ♂, "forma A" (specimen of Stat. 312), inner view, magn. 10. Fig. 3*e* ♂, "forma B" (specimen of Stat. 312), magn. 4. Fig. 3*f* carapace of same specimen, seen obliquely in dorsal and in facial view, magn. 10. Fig. 3*g* external maxilliped of same specimen, magn. 10. Fig. 3*h* left chela of same specimen, outer view, magn. 10 (beneath it the serrulation of inner margin of fixed finger, magn. 60). Fig. 3*i* abdomen of same specimen, inner view, magn. 10.

1

2a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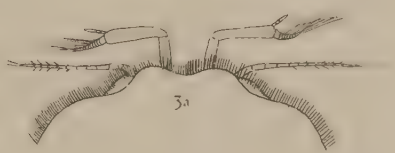
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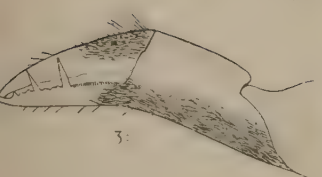
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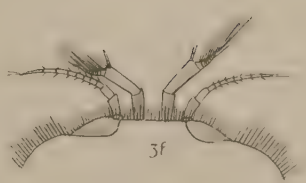
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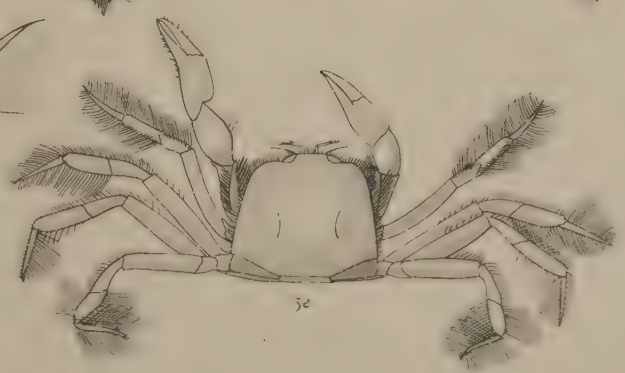
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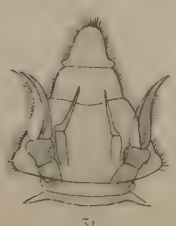
3i

3g

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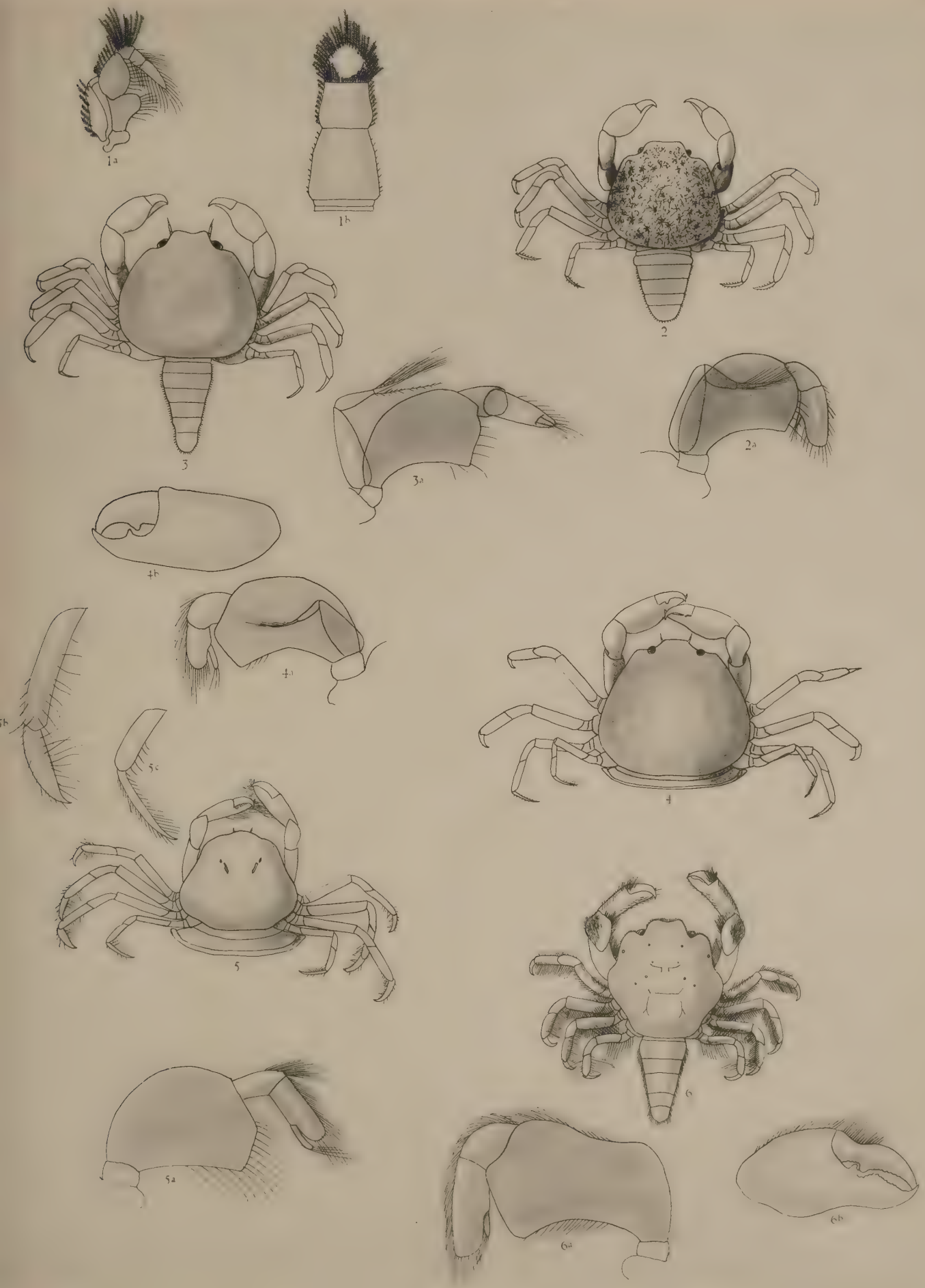
1 *Litocheira subintegra* Lanchester. 2a *Mertonia lanka.* Laurie

PLATE XVII.

Fig. 1 *a*. *Hexapus sexpes* (Fabricius), external maxilliped, magn. 10. Fig. 1 *b* abdomen of ♂, magn. 10.
Fig. 2. *Pinnotheres quadratus* Rathbun, ♂, magn. 10. Fig. 2 *a* external maxilliped, magn. 40.
Fig. 3. *Pinnotheres obesus* Dana, ♂, magn. 10. Fig. 3 *a* external maxilliped, magn. 40.
Fig. 4. *Pinnotheres consors* Bürger, ♀, magn. 7. Fig. 4 *a* external maxilliped, magn. 30. Fig. 4 *b* left chela of ♀, outer view, magn. 16.
Fig. 5. *Pinnotheres onychodactylus* n. sp., ♀, magn. 3. Fig. 5 *a* external maxilliped, magn. 20. Fig. 5 *b* propodite and dactylus of left penultimate leg, magn. 10. Fig. 5 *c* propodite and dactylus of left last leg, magn. 10.
Fig. 6. *Pinnotheres trichopus* n. sp., ♂, magn. 4. Fig. 6 *a* external maxilliped, magn. 30. Fig. 6 *b* right chela of ♂, outer view, magn. 10.



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1. Hexapus sexpes (Fabricius).
2. Pinnotheres quadratus Rathbun.
3. Pinnotheres obesus Dana
4. Pinnotheres consors Bürger.
5. Pinnotheres onychodactylus n. sp.
6. Pinnotheres trichopus n. sp.

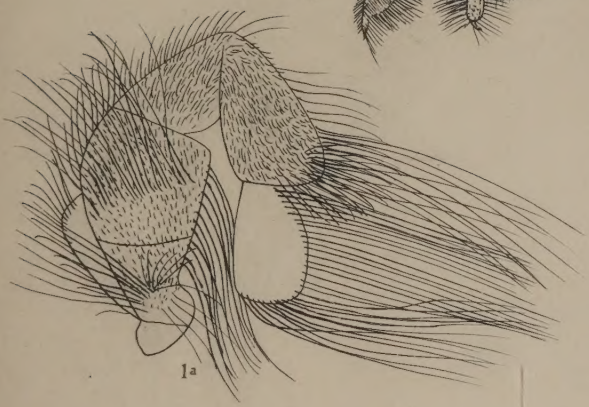
PLATE XVIII.

Fig. 1. *Tetrias fischeri* (A. Milne-Edwards), ♀, magn. 5. Fig. 1*a* external maxilliped, magn. 30. Fig. 1*b* right last leg, magn. 10.

Fig. 2. *Aphanodactylus sibogae* n. g. n. sp., ♀, magn. 3. Fig. 2*a* ♂, magn. 4. Fig. 2*b* external maxillipeds, magn. 10. Fig. 2*c* right chela of ♂, outer view, magn. 5. Fig. 2*d* left penultimate leg of ♂, magn. 10.

Fig. 3. *Hapalonotus reticulatus* (de Man), ♀, magn. $1^1/_2$. Fig. 3*a* anterior part of cephalothorax, ventral view, magn. 2. Fig. 3*b* abdomen of ♀, magn. 2.

1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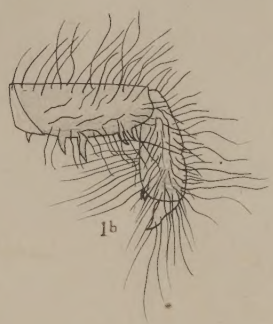
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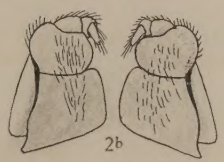
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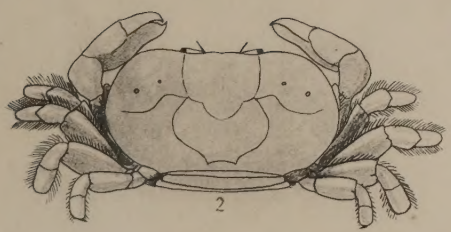
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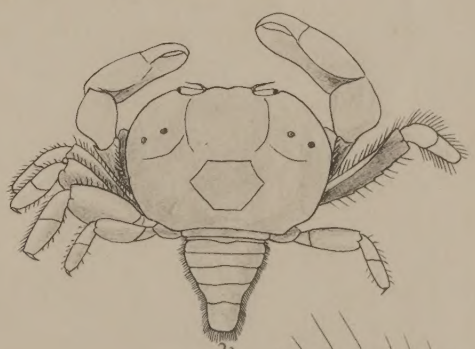
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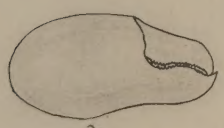
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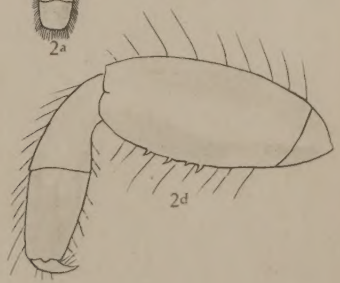
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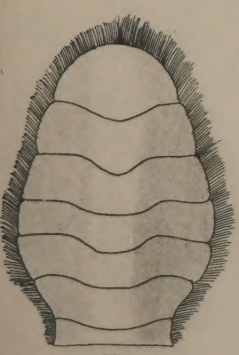
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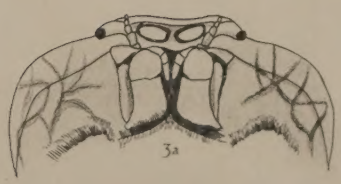
3a

J. Tesch, del.

HELIOTYPIE, L.VAN LEER & Cº AMSTERDAM.

1. Tetrias fischeri (A. Milne-Edwards).

2. Aphanodactylus sibogae n. g. n. sp.

3. Hapalonotus reticulatus (de Man).